Medweb Secure DICOM Proxy Webserver

Administrator Guide and User Manual

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ADMINISTRATOR GUIDE AND USER MANUAL

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1.0 Introduction

Thank you for purchasing your Medweb Server. Medweb appreciates your business and continual support.

The following user manual has been created to assist in operating and configuring Medweb servers.

1.1 Copyright

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Operating instructions and manuals are protected by copyright. No part of this document may be reproduced, stored in retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, edited or translated, without the prior written or verbal consent of Nexsys Electronics, (d.b.a. Medweb) Inc.

1.2 Limited Product Warranty

Medweb warrants that this product and all components thereof, will be free of defects in workmanship and materials for a period of one year from the date of delivery to the original consumer/purchaser (the "Warranty Period"). This warranty will not apply to repair or replace necessitated by:

- Any damage caused during shipment except by the original consumer/purchaser.
- Any damage caused by natural acts such as fire, flood, wind, earthquake, lightening or similar disaster.
- Damage from use outside the product usage parameters.
- Damage from upgrade outside the product upgrade parameters, and unauthorized modifications or incorporation into another product.
- Damage caused by improper use, environment, installation or electrical supply; improper maintenance; or any other misuse, abuse or mishandling.
- Any modification of files from a telnet or console shell (this includes, but is not limited to configuration files, software programs and data that are part of the product's operating system) that results in improper or impaired function of the product or system failure. This excluded modification of files by employees of Medweb.

Non-Conforming Products. Upon discovery of any failure of a Medweb product or component thereof, to conform to the above warranty during the Warranty Period, the consumer/purchaser will promptly contact Medweb and seek a return merchandise authorization ("RMA") number. Each requested RMA number will be issued within three days after the consumer/purchaser requests thereof. The allegedly defective Medweb product, or component thereof, will be returned to Medweb, securely and properly packaged, freight and insurance prepaid, with the RMA number prominently displayed. Medweb will have no obligation to accept any Medweb product, which is returned without an RMA number and will not accept returns from anyone other than the original consumer/purchaser.

Medweb will use diligent efforts to either replace or repair, as its option, within (10) days any Medweb product or component found to be non-complying and will return such Medweb product or component to the original consumer/purchaser, freight and insurance prepaid. In the event that Medweb, in its sole discretion, determines that it is unable to replace or repair the Medweb product or component, it will refund to the original consumer/purchaser the F.O.B. price paid by the consumer/purchaser for such defective product. The foregoing constitutes the original consumer/purchaser's sole remedy for Medweb's breach of the warranty provided herein.

1.3 Safety and Operating Instructions

It is important that the following safety and operating instructions be observed to ensure safe and reliable operation your Medweb product.

- Install equipment in a dry, cool place.
- Clean the equipment with a dry cloth only.
- Do not use the components and cables outdoors.
- To prevent overheating, do not expose to direct sunlight.
- Never open the equipment yourself.

1.4 Assistance and Problem Reporting

Points of contact and procedures for obtaining assistance and reporting problems encountered in using the software and/or hardware, should be reported to Medweb Technical Support at ts@medweb.com or in the case of emergency, please call (1-800-8 Medweb or 415.541.9980). Medweb is responsible for the deployment and long-term support of the Medweb Server, including equipment installation at operational sites, as well as installation of product upgrades.

1.4.1 User Manual Accessibility

This user manual is provided for the Administrator of every Medweb Server. It can be found under Administrator Site/Manuals. You can also contact Medweb or your Reseller for a copy of our User Manual.

2.0 Product Overview

2.1 Introduction

The Medweb Server is a compact, full-featured Picture Archiving and Communications System, Teleradiology and/or Telemedicine System for any facility that provides medical imaging services; it is ideal for multi-chain imaging centers, hospitals with satellite clinics, regional healthcare enterprises and small, rural sites.

A complete all-in-one hardware and software server solution for acquisition, compression and routing of DICOM and non-DICOM studies, the Medweb Server integrates with existing PACS and DICOM modalities to facilitate low-cost, high-performance management solution. Powerful image and web technology, dynamic email and low maintenance design make it ideally suited for a distributed environment.

Users only require a PC, browser and the free Medweb Image Viewer Plugin, which is essentially an image manager that decompresses, opens and displays studies from within a web browser. The Server may also be administered locally from a PC on the LAN, or remotely from a central site, greatly reducing administration costs.

2.2 DICOM Introduction

DICOM is a medical imaging standard that allows the transmission of medical images and all of their relationship data from hundreds of different types of medical devices. It includes the complete suite of Radiology devices, and now included imaging devices from Dentistry, Ophthalmology, Pathology, and Orthopedic Surgery etc.

It is designed to provide DICOM work list, DICOM routing, DICOM storage, and DICOM reports for multiple devices in a department or clinic. The number is based on the hardware configuration; however, any version of server can easily handle a dozen devices.

The Server provides a rich feature set of DICOM services, these include:

- → DICOM Worklist (Query, Retrieve, Forwarding)
- → DICOM Routing
- → DICOM Storage
- → DICOM Reports
- → DICOM Print
- → DICOM Webserver
- → DICOM Tunnels (Compressed and Encrypted)

3.0 Server Basics and Original Setup

3.1 Requirements

1. An Ethernet-based local area network (LAN). 10/100 Base TX network cables are ok.

2. Network Parameters, including the Server's assigned IP address, subnet mask of the local network, and a gateway/router address (if necessary).

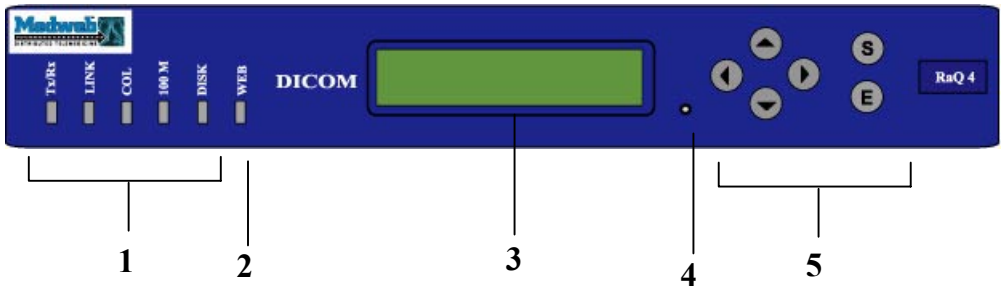
3. A personal computer attached to the network with Windows 2000, Win XP, UNIX or Macintosh OS 9.1 and higher.

PC Requirements: Pentium 3 or better (750 MHz or greater)
128MB of RAM
Minimum 1024x768 Resolution Monitor at 32 bit color depth

4. A browser on the computer is also necessary. Internet Explorer 5.5 Service Pack 2 or later OR Netscape Navigator 6.0 or later is desired (if using PC Image Viewing Workstation). The browser must have Java/JavaScript enabled.

5. The Medweb Image Viewer Plugin (if using PC Image Viewing Workstation).

3.2 Physical Description



1. The **Status Indicators** signal Ethernet and hard drive activity

Tx/Rx (Transmit/Receive) blinks when there is a network traffic on the primary interface.
Link indicates an active network connection on the primary interface.
Col blinks when a collision is detected on the primary interface.
100 M indicates that 100 BaseT Ethernet is being used on the primary interface.
Disk indicates activity on the hard disk drive.

2. The **Web** indicator blinks to indicate Web activity.

3. The **LCD Screen** displays messages and values entered.

4. You can use the recessed **Reset Password** button if you forget the Server Administrator password.

5. The **LCD Arrow buttons** allow you to enter the network configuration information, configure a UPS unit, and reboot the server and power down the Server. Use the **Arrow** buttons to toggle between

choices or to enter values. The **S** (Select) button displays the next option. The **E** (Enter) button accepts the information entered or the option displayed.

3.3 Powering On the Medweb Server

Turn on the power by pressing the On/Off switch on the back of the Server. The LCD screen on the front should light up and a number of status messages should appear on the LCD screen as the Server completes the boot process. This may take a few minutes.

3.4 Powering Off the Medweb Server

NOTE: Never attempt an improper shutdown. Turning off the server before completing the procedure detailed below, can result in damage to your hardware and the possible loss of data.

1. On the LCD screen, hold down the **S**elect button for approximately 3 seconds.

2. The LCD screen should display:

SELECT:

SETUP NETWORK

3. Press the **S** button until **POWER DOWN** appears in the LCD screen and press the **E**nter button.

4. Use the left and right arrows to toggle the cursor between [Y]es and [N]o. Select [Y] to power down the system by pressing the **E** button when [Y]es is blinking.

5. The OK to Power Off light on the back panel should blink. The LCD screen will display:

PLEASE SWITCH

POWER OFF NOW

Toggle the **On/Off Switch** on the back panel to the **Off** position.

3.5 Rebooting the Medweb Server

Use the same steps as Powering off to toggle the selection to REBOOT on the LCD Screen and press the E button.

Use the arrow buttons to toggle the cursor between [Y]es and [N]o. Select [Y] to Reboot the system by pressing the **E** button when [Y]es is blinking.

The Server will now automatically reboot itself; no further action is needed. This may take a few minutes.

3.6 Assigning Network Properties to the Server

Make sure you have the following information before proceeding:

- The IP address assigned to the Server (at least one static IP Address)

- The Subnet mask of your network
- The Gateway/Router address (if necessary)

1. Using the same instructions in "Powering down the Server", toggle to **ENTER IP ADDR** using the **S** button.

2. Enter the IP address assigned to the Server using the arrow buttons to input the numbers. Press **E** once finished.

3. If the IP address is valid, the prompt for **ENTER NETMASK** appears on the LCD screen. Enter the subnet mask using the arrow buttons assigned to the server. Press **E** once finished.

4. If the netmask is valid, the prompt for **ENTER GATEWAY** appears on the LCD screen. Enter the IP address of the gateway for your network using the arrow buttons. If your network does not have a gateway, do not enter any numbers and simple select the default value of 000.000.000.000 and press **E**.

5. The LCD should display a **[S] AVE** and **[C] ANCEL** option. Use the left and right arrows to toggle between the two choices. Select [S] to save by pressing the **E** button when [Y]ES is blinking.

6. The LCD will display **VERIFYING AND SAVING**. The Server will automatically reboot. The LCD Screen should display the IP address of the Server once finished booting.

To reset the IP address or change any values in the network configuration of the Server, please follow the directions above.

For more Instructions on Network setup, Visit Section 6.0, Administrative Procedures.

3.7 Changing Disk Drives

In some cases, the server will be equipped with a redundant or backup hard drive. In the event of a failure of the primary hard drive, you will need to make a switch to the back up drive. The administrator is sole person permitted to perform this function.

1. Power Down the Server using the instructions provided above.

2. Disconnect all cables and power supply from the Server. Please assure that it is OFF before disconnecting anything.

3. Unscrew all screws on the side and the back and proceed to lift the top off the Server.

4. The hard drives are located directly behind the LCD Screen on the inside of the Server. Disconnect the power supply (red, orange and yellow wire) and the ribbon cable from the primary drive.

5. Connect the ribbon cable and the power supply cable into the appropriate port in the backup hard drive.

6. Snap the top back into place and put in all the screws.

7. Power on the Server using the instructions provided above.

4.0 Logging In To the Medweb Server

4.1 Administrator

The Administrator obtains their initial password from the installation team. The default login is set to **Username**: Admin **Password**: Admin. The Administrator must, upon initial login, proceed to the Administrator Site, and change the Administrator Settings. The Administrator may change password or profile by going to their web site address and:

- Click on Administrators Site
- Click on Administrator Settings
- You must click Save Changes

After changing the password, the Administrator may need to authenticate himself through the web browser with the new password.

Procedures for adding, deleting, or changing passwords are contained in Section 7, Maintaining User Accounts Procedures. For the instructions for users to change their passwords, also refer to Section 11, Maintain User Accounts Procedures.

4.2 Logon Using Web Interface

1. Assure that power has been provided to the server and an Ethernet cable (CAT 5) has been plugged in to the Primary interface on the back of the server.

2. Network properties must be assigned using the LCD Screen (Section 3.6 Assigning Network Properties to the Server).

3. Sign on to the Medweb Server by typing the http address of the server into the URL field of the browser.

Ex: http://xxx.xxx.xxx.xxx (IP Address) or http://www.medweb.com (host and domain name).

Note: If you use https at the beginning of the URL, then the browser will automatically access port 443 on the Medweb server.

4. Click the View Patients button or the Administrator Site button, and the user will be prompted to fill in the appropriate username and password.

5.Enter a Username and Password assigned into the adjacent textboxes.
The Server Administrator is assigned a username of admin and a password of admin by default.

6.Press OK. Note*: If an invalid username or password is entered an identical screen will reappear for a second try. The amount of times a user may try is dependent upon Administrator Settings.

4.3 Telnet/SSH Access

The Medweb Server permits Telnet Access or SSH into the Server. Secure Shell is a program to log into another computer over a network, to execute commands in a remote machine, and to move files from one machine to another. It provides strong authentication and secure communications over

insecure channels. It is a replacement for rlogin, rsh, rcp, and rdist. SSH protects a network from attacks such as IP spoofing, IP source routing, and DNS spoofing. An attacker who has managed to take over a network can only force SSH to disconnect. He/she cannot play back the traffic or hijack the connection when encryption is enabled. All configuration and operation of the Server is done via the website interface, so typically there is no need to establish telnet or SSH access to the server. Although Medweb permits telnet access into the server, it is specifically discouraged and is therefore disabled by default.

5.0 Users, Groups and Mailing Lists

5.1 User Management

The Medweb Server Administrator provides users with valid user IDs and initial passwords. The user role set for the individual username determines the level and scope of access to the server. Only the Administrator may add, modify or delete users.

The user management page of the administrator web site allows the administrator to create new users, assign or change passwords, and choose which ACL groups or (access control group) to assign the users. Please see Section 7.0 Maintaining User Accounts for Information on how to create and manage user accounts.

If the facility has an LDAP server, then the central LDAP server instead of using the administrator page can control User access and password management.

5.1.1 Access Control Levels (ACL)

The Medweb server has several access control levels. The server administrator creates a user login account. The administrator assigns the level of access based on the user's clinical requirements.

5.1.1.1 Groups

The Medweb server has several access control groups that have varying access to the server functions and to specific patient data groups. Access control levels include, Radiologist, Technologist, Referring MD, Transcriptionist, Provider, Demo and Administrator. The control functions for each group are as follows:

Radiologist

- Allowed to access Server
- Allowed to attach reports to studies
- Allowed to open On Call window
- Allowed to view changes
- Allowed to view access logs and usage statistics
- Allowed to view/write/attach web reports
- Allowed to change Read/Unread status of Study
- Allowed to change Hold/Unhold status of Study
- Allowed to delete Study
- Allowed to view/change security permissions
- Allowed to burn study to CD ROM
- Allowed to open study in Plugin
- Allowed to use Query/Retrieve function
- Allowed to send study as HTML document by e-mail
- Allowed to send study as PDF document by e-mail
- Allowed to send study as MWW (plugin format) by e-mail
- Allowed to send study to remote device
- Allowed to print study on DICOM printer
- Allowed to write study to USB drive

Administrator:

- Allowed to access Server
- User can view all studies assigned only to him
- Allowed to delete Study
- Allowed to view/change security permissions

- Allowed to create new studies
- Allowed to attach reports to studies
- Allowed to open On Call window
  Allowed to view changes
- Allowed to view access logs and usage statistics
- Allowed to view/write/attach web reports
- Allowed to change Read/Unread status of Study
- Allowed to change Hold/Unhold status of Study
- Allowed to burn study to CD ROM
- Allowed to open study in Plugin
- Allowed to use Query/Retrieve function
- Allowed to send study as HTML document by e-mail
- Allowed to send study as PDF document by e-mail
- Allowed to send study as MWW (plugin format) by e-mail
- Allowed to send study to remote device
- Allowed to print study on DICOM printer
- Allowed to write study to USB drive

Guest:
Allowed to access Server
Allowed to view changes

No Access:
Has no permissions

Provider:
- Allowed to access Server
- Allowed to view/change security permissions
- Allowed to open study in Plugin
- Allowed to send study as HTML document by e-mail
- Allowed to send study as PDF document by e-mail
- Allowed to send study as MWW (plugin format) by e-mail

Transcriptionist:
- Allowed to access Server
- User can view all studies assigned only to him
- Allowed to attach reports to studies
- Allowed to view changes
- Allowed to view/write/attach web reports
- Allowed to send study as HTML document by e-mail
- Allowed to send study as PDF document by e-mail
- Allowed to send study as MWW (plugin format) by e-mail
- Allowed to send study to remote device
- Allowed to print study on DICOM printer
- Allowed to write study to USB drive

Referring M.D.:

- Allowed to access Server
- User can view all studies assigned only to him
- Allowed to attach reports to studies
- Allowed to open On Call window
- Allowed to view changes
- Allowed to change Hold/Unhold status of Study
- Allowed to open study in Plugin
- Allowed to send study as HTML document by e-mail
- Allowed to send study as PDF document by e-mail
- Allowed to send study as MWW (plugin format) by e-mail
- Allowed to send study to remote device
- Allowed to print study on DICOM printer
- Allowed to write study to USB drive

Scheduler (For the RIS Application):
Allowed to access Server
Display RIS page instead of Patient Page

Technologist:

- Allowed to access Server
- Allowed to create new studies
- Allowed to attach reports to studies
- Allowed to view changes
- Allowed to delete Study
- Allowed to view/change security permissions
- Allowed to burn study to CD ROM
- Allowed to open study in Plugin
- Allowed to use Query/Retrieve function
- Allowed to send study as HTML document by e-mail
- Allowed to send study as PDF document by e-mail
- Allowed to send study as MWW (plugin format) by e-mail
- Allowed to send study to remote device
- Allowed to print study on DICOM printer
- Allowed to write study to USB drive

Administrator
Complete access

5.1.2 Passwords and Login

All users of the Medweb server are required to have individual passwords. The password and login limit user access to designated areas of the server. This includes limiting access to specific patient files.

5.1.2.1 Remote Access Restriction by User

All login and password entry's are via encrypted SSL access. No password or login is ever entered in the clear.

5.1.2.2 Remote Access Restriction by Interface

The admin user has access to the administrator section of the webserver via a separate port from regular users. As such, access to the admin site is not only limited to a specific user login, but can also be limited to a particular interface of the Medweb server so that

administration can be limited only to someone accessing the server from the internal LAN interface.

5.1.2.3 Remote Access Restriction Based on Originating IP Address

The Medweb server has a packet filter that can limit access to specific TCP port numbers and specific interfaces, and specific originating IP addresses. Typically only port 443 is open on the outside for encrypted remote web access.

5.1.2.4 File System Access

Neither admin user nor regular users have direct file system access. All access is through an application guided web interface with mandatory access controls based on user, group, and task. File system access is only available to root or admin via SSH. However, this is not required for regular maintenance of the server. User, date, and time log all activities whether access is via shell, or via web interface as part of the standard UNIX logging function. SSH access is not required for operation and can be disabled, thereby disabling direct file system access.

5.2 User Accounts

This section contains procedures for creating and maintaining user accounts.

5.2.1 Maintain User Accounts

This section provides information on how to maintain Medweb Server user accounts by performing the following:

- Check login status
- Setting User defaults
- Modify a user password
- Create user accounts
- Delete user accounts
- Modify a User Access Level

The administrator is, by default, the only person able to add or delete a user, change passwords and access levels. All users of the Medweb server are required to have individual passwords. The password and login limit user access to designated areas of the server. This includes limiting access to specific patient files.

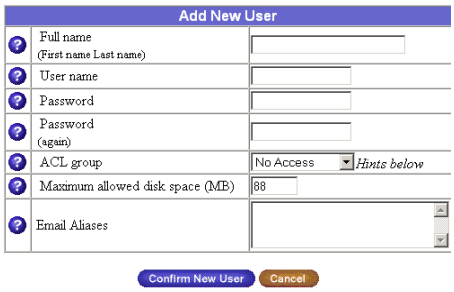
5.2.1.1 Add a New User

1. Sign on to the Medweb Server and login as the Administrator. Click on Administrator Site on the Navigation Menu and then click the **User** Button.

2. Click the Add User button.

3. Fill in the user information and provide a password. The username used by the Server to identify the user. It also appears in the URL of the web site and the email address of the user. Only lowercase alphanumeric characters, periods (.), hyphens (-) and underscores (_) are allowed.

4. The Administrator must to assign a password for the user account being created. Enter a password containing 3 to 16 characters. A string password is one that is difficult to guess, not found in any dictionary, and is 5 or more characters with at least one non-alphabetical character. Passwords are case sensitive.



5. Assign the user to a particular ACL group. Medweb has coined 5 groups that possess certain permissions. These groups are described in Section 6.1.1.1, Administrative and Security Roles.

6. Click Confirm New User

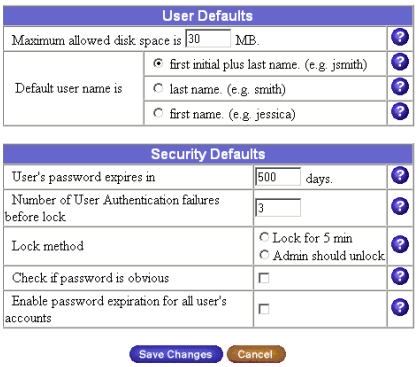
5.2.1.2 Set User Defaults

Only the Administrator may assign User defaults. Follow the steps below to set user defaults.

1. To configure your user defaults (password rules, expiration etc) click the Set User Defaults Button at the top of the table.

2. The Administrator may customize the following properties for all user accounts:

- Allowable disk space per user (typically 30MB)
- The username format for all users
- Enabling password expiration and setting time limits
- Password authentication/failure options


User Defaults
Maximum allowed disk space is 30 MB.
Default user name is
first initial plus last name. (e.g. jsmith)
last name. (e.g. smith)
first name. (e.g. jessica)
Security Defaults
User's password expires in 500 days.
Number of User Authentication failures before lock 3
Lock method
Lock for 5 min
Admin should unlock
Check if password is obvious
Enable password expiration for all user's accounts
Save Changes
Cancel

3. Click Save Changes to accept new defaults.

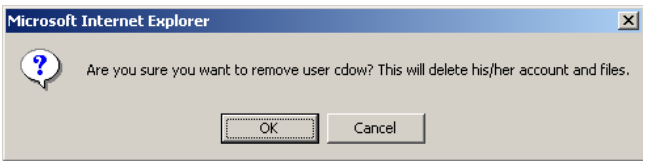
5.2.1.3 Deleting a User

1. Sign on to the Medweb Server and login as the Administrator.
2. Click on the Administrator Site button on the Navigation Menu. The next screen will present a table of all current users on the Server.

3. Beside each user listed, the administrator has the option to modify the Users' Profile, Modify the email Address or Delete the study.

4. Click the trashcan icon to delete a user.

5. The Server will generate a default message.


Microsoft Internet Explorer
Are you sure you want to remove user cdow? This will delete his/her account and files.
OK
Cancel

6. Click OK to confirm the deletion of a particular user.

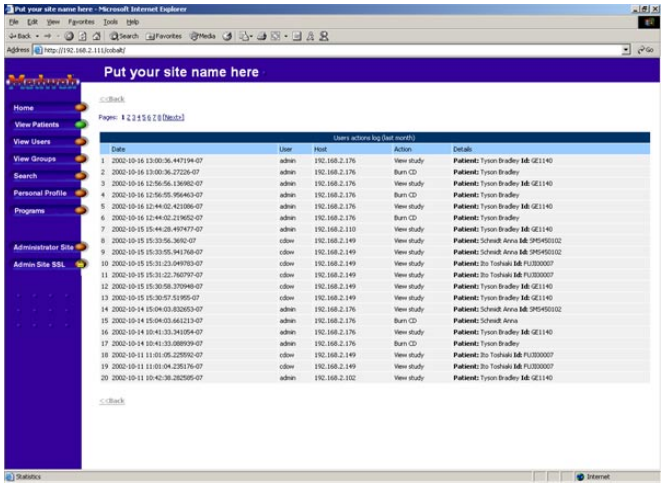
5.2.1.4 Check Login Status

The Administrator as well as a User with a Radiologist Access level will be able to access the Server Statistics. The Statistics page details the rate at which a user may access studies, user information, studies being viewed, and study information (name, modality etc).

1. Sign on to the Medweb Server and login using as the Administrator or as a User with Radiologist Level Access.

2. Click on View Patients on the Navigation Menu.

3. Click on Statistics in the top right hand corner of the View Patients Page.



4. Click View Full Web Statistics. Information about users accessing the studies, such as IP Address of the user's machine, username, studies viewed, and actions performed are listed in a table.

These statistics would be updated under the local direction of the Administrator.

5.2.1.5 Change a User Password Or Access Level

Changing a user's password will ensure that data are kept secure on the system. Please obtain local direction to determine official password policy.

- Passwords should be changed regularly in accordance with local policy regarding the maximum number of days allowable between changes.

- If the Administrator changes a password, the old password will be expired so that the user is forced to change the password the next time the user logs onto the system.

Only the Server Administrator may change a user password. Follow the directions below to change the password.

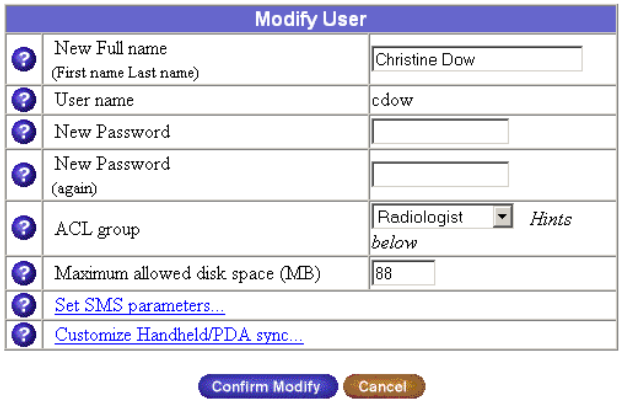
1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. The next screen will present a table of all current users on the Server.

3. Beside each user listed, the administrator has the option to modify the Users' Profile, Modify the email Address or Delete the study.

4. Click the pencil icon to modify the password of a user.

5. Enter the new password into the textboxes.



6. To change the Access Level, click the ACL Group drop down menu and choose the appropriate level.

7. Click Confirm Modify.

5.3 Logging and Auditing of User Activity

The Medweb server logs all activity by Date, time, user, and user actions. The administrator can easily see who has accessed the server, and what machine was used to login to the server from the web logging screen. The administrator can also see what patient studies the user accessed from the web interface. All regular user activities are visible from the web-logging screen. The administrator can search for activities of a specific user as well as activities around a specific patient record.

5.4 Remote Access Protection and File Protection

Remote access is only accomplished through a 128-bit SSL connection. After the encrypted connection is established, the remote access user is able to enter a login and password in the SSL link established by the browser.

After entering an incorrect password 3 times in a row, a user account will be disabled and needs to be restarted by the administrator (this rule can be modified, Section 7.1).

File protection is achieved by limiting each user only to specific application guided functions that relate to their particular access need. Therefore the user does not have access to view or modify any file or application that is not “owned” by that user login, or is part of the class of applications that the particular user is allowed to access. Since ALL ACCESS is through the web interface, the user is extremely limited in what applications or files they can access. Web-only access is also effective in restricting direct access to database and OS files. Additional file protection is afforded by leaving ownership of root files separate from ownership of data files associated with the Medweb applications. No user may modify these files directly except root. All modifications are logged.

5.5 Groups

Groups are meant to further categorize users.

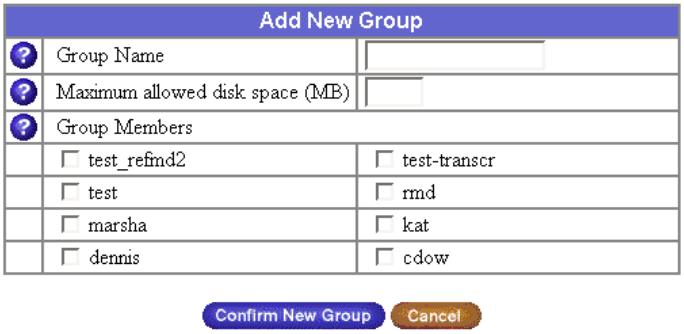
5.5.1 Set Group Defaults

Begin by setting the default parameters for new groups.

1. Go to Administrators Site – Groups.
2. Click the **Set Group Defaults** Button.
3. Enter maximum allowed disk space for the group by default.
4.Click Save Changes to save or Cancel to return to the previous page.

5.5.2 Add a Group

1 Go to Administrators Site – Groups.
2. Click the **Add Group** Button.



3. Enter a distinct group name.
4. Enter the maximum allowed disk space or accept the default.
5. Click the boxes adjacent to select the users to add to the group.
6. Click **Confirm New Group** or Cancel to return to the previous screen.

5.5.3 Delete or Modify a Group

Once a group is added it appears on the Groups List and may be modified or deleted via the pen or trashcan icons.

1. Go to Administrators Site - Groups
2. Click the pen icon to modify the group
3. The same screen as the Add a group appears. Make the changes and click **Confirm Modify** to save the changes.

To delete a group, use the Trashcan icon to perform the delete.

5.6 Mailing Lists

Mailing lists are meant to distribute emails to local and remote addresses via one named list.

5.6.1 add a Mailing List

Add a mailing list of local and remote users.

1. Go to Administrators Site – Groups

2. Enter a distinct name for the mailing list.

3. Enter the full email addresses of any remote recipients to be included in the list.
4. Select the name of any local users to be included in the list.
5. Click **Confirm New Mailing List** to save or Cancel to go back to previous page.

5.6.2 Delete or Modify a Mailing List

1. Go to Administrators Site - Groups

2. Click the pen icon to modify the group

3. The same screen as the Add a Mailing List appears. Make the changes and click **Confirm Modify** to save the changes.

To delete a group, use the Trashcan icon to perform the delete.

Note: Any groups you add will be listed as a mailing list as well and may be modified via the pen icon, but not deleted. To delete these group-based mailing lists, remove the group entirely. In either case the mailing list may exist with no users added.

6.0 Administrative Procedures/Services

6.1 Network Configuration

The server is equipped with a Primary Interface and a Secondary Interface. The primary port is the IP address of the primary interface, which connects to your Intranet and the secondary interface is used to connect out to the Internet or to the Medweb network.

6.1.1 Modifying Network Settings

The web interface should be used to make any changes to existing Ethernet settings.
(A gateway address is required to connect to systems outside the local network. It may be left empty if you do not wish to access outside networks. If you are using a modem, the word modem will be in this field.)

1. Sign on to the Medweb Server and login using as the Administrator.
2. Go to Administrator Site - Network

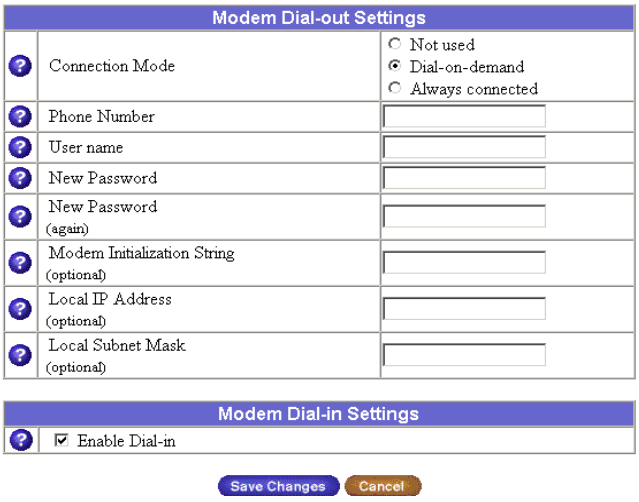
3. Enter the unique name for this server on your network.
4. Enter the domain name for your network.
5. Enter your primary DNS server IP address.
6. Enter an optional secondary DNS server IP address.
7. Enter the default gateway IP address for the network.
8. Select the check box to enable IP forwarding.
9. Enter the unique IP address for the primary interface of this server.
10. Enter the subnet mask for this interface.
11. Select to enable Network Address Translation.

12. The hardware or MAC address of your interface is listed.
13. Enter the unique IP for the secondary interface (optional).
14. Enter the subnet mask for the secondary interface (optional).
15. The hardware or MAC address of the secondary interface is listed.
16. Click Save Changes to save.

6.1.2 Modem Settings

Manage the phone line dial out settings from your server.

1. Click the **Modem** Button at the top of the screen (Administrator Site – Network).



2. Select the connection mode; 'Not used' if you do not use a modem, 'Dial-on-demand' to dial only when there is data to send, 'Always connected' to maintain a modem connection at all times.
3. Enter the phone number to dial.
4. Enter the User name to connect to your ISP.
5. Enter the Password used to connect to your ISP. Repeat.
6. Enter any modem initialization strings for dialup (optional).
7. Enter the Fixed Local IP address, if one is assigned.
8. Enter the network's subnet mask if assigned a fixed IP.

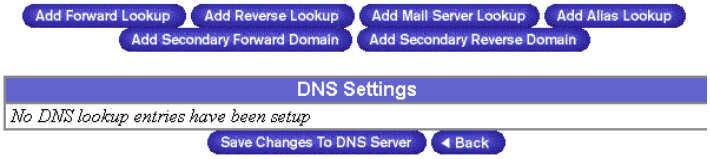
-----Manage the phone line dial up settings to your server:

9. Select to enable Dial-in to your server by checking the check box.
10. Click **Save Changes** to save or Cancel to return to the previous screen.

6.1.3 Domain Name Service - DNS

Obtain the IP address of the primary Domain Name Service server (DNS server). The DNS server converts between IP addresses and the host names of devices on the network. It is required to receive email.

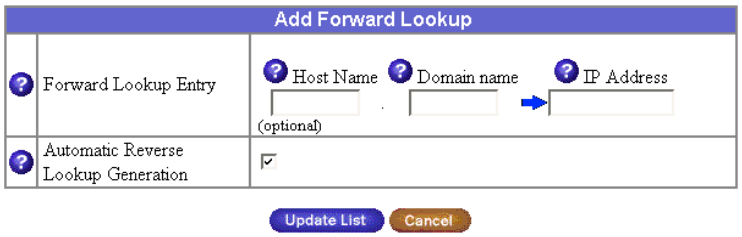
1. Go to Administrators Site – Control Panel - Domain Name Service (DNS) Server.



2. Select the check box beside DNS to enable DNS serving.
3. Click **Parameters** to manage settings for DNS server

6.1.3.1 Add Forward Lookup

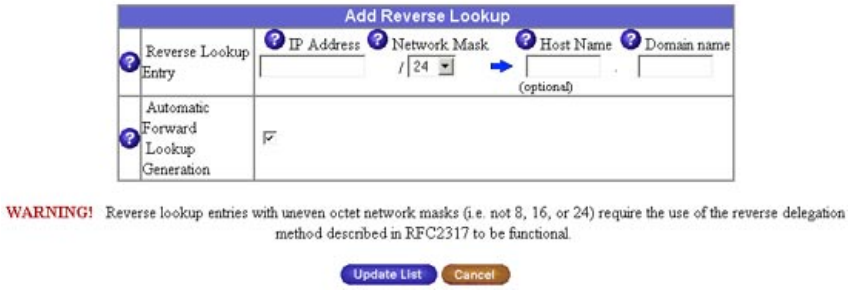
1. Click the **Add Forward Lookup** Button.



2.Enter the hostname and domain name for resolution to an IP address.
3.Select the check box to enable Automatic Reverse Lookup Generation to automatically create the Reverse Lookup record (below).
4. Click **Update List** to save or Cancel to return to the previous screen.

6.1.3.2 Add Reverse Lookup

1. Click the **Add Reverse Lookup** Button.


Add Reverse Lookup
Reverse Lookup Entry
IP Address
Network Mask
/24
Host Name
Domain name
(optional)
Automatic Forward Lookup Generation
WARNING! Reverse lookup entries with uneven octet network masks (i.e. not 8, 16, or 24) require the use of the reverse delegation method described in RFC2317 to be functional.
Update List
Cancel

2. Enter IP Address, Network Mask number for resolution to a hostname and domain name.
3. Select Automatic Forward Lookup Generation to automatically create the Forward Lookup record (above).
4. Click **Update List** to save or Cancel to return to the previous screen.

Note: The DNS Settings table should contain 2 hostname/IP address associations for each record. Forward lookups will resolve hostname to IP address; Reverse lookups will resolve IP's to hostnames

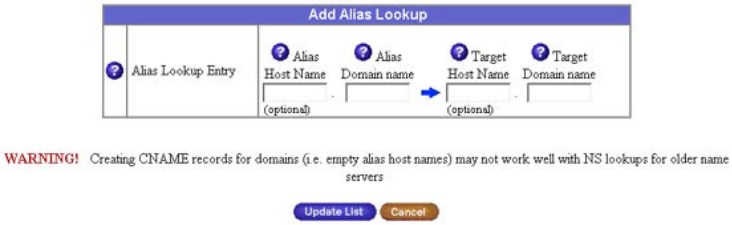
6.1.3.3 Add Mail Server Lookup

1. Click the **Add Mail Lookup** button.

4. Enter the name of the mail server that will handle mail for accounts on this host.
5. Select a delivery preference: Very Low, Low, High or Very High.
6. Click **Update List** to save or Cancel to return to the previous screen.

6.1.3.4 Add Alias Lookup

1. Click the **Add Alias Lookup** button.


Add Alias Lookup
Alias Lookup Entry
Alias Host Name
Alias Domain name
Target Host Name
Target Domain name
(optional)
(optional)
WARNING! Creating CNAME records for domains (i.e. empty alias host names) may not work well with NS lookups for older name servers
Update List
Cancel

1. Enter the alias hostname.
2. Enter the alias domain name.
3. Enter the target hostname.
4. Enter the target domain name.
5. Click **Update List** to save or Cancel to return to the previous screen.

6.1.3.5 Add Secondary Forward Domain

1. Click the **Add Secondary Forward Domain** button.

2. Enter the domain name you wish to DNS serve with another host.
3. Enter the hostname of the DNS server for that domain.
4. Click **Update List** to save or Cancel to return to the previous screen.

6.3.6 Add Secondary Reverse Lookup Domain

1. Click the **Add Secondary Reverse Domain** button.

2. Enter the network address you wish to DNS serve with another host.
3. Select the number of bits for the network mask.
4. Enter the hostname of the DNS server for that network.
5. Click **Update List** to save or Cancel to return to the previous screen.

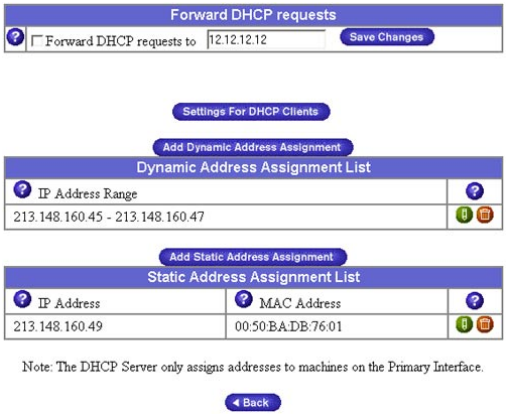
Note: After any changes to DNS, click the Save Changes button to save the information or Back to cancel

Note: Any additions to DNS settings will be displayed in the DNS Setting table, and can be modified by selecting the green pencil icon, or deleted with the trash icon.

6.1.4 Dynamic Host Configuration Protocol – DHCP

This feature assigns dynamic IP addresses to devices on a network.

1. Go to Administrators Site – Control Panel – Dynamic Host Configuration Protocol (DHCP) Server.
2. Select the check box beside DHCP to enable DHCP serving.
3. Click **Parameters** to manage settings for DHCP server.

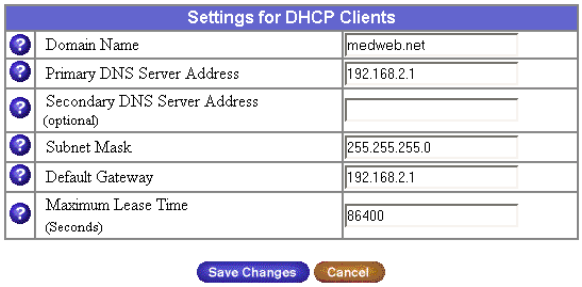


6.1.4.1 Forward DHCP Requests

1. Select the check box to enable the forwarding of requests.
2. Enter the IP address of the DHCP server.
3. Click **Save Changes.**

6.1.4.2 Set DHCP Clients

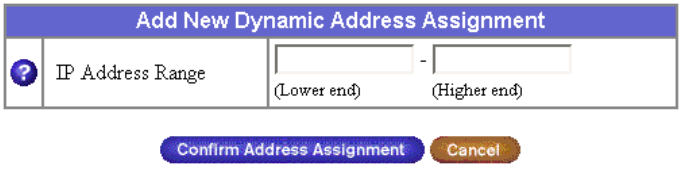
1. Click the **Settings for DHCP Clients** Button to manage the DHCP client parameters.



2. Enter the Domain Name for your DHCP clients.
3. Enter the Primary DNS Server Address for your DHCP clients.
4. Enter the optional Secondary DNS Server Address for your DHCP clients.
5. Enter the Subnet Mask for your DHCP clients.
6. Enter the Default Gateway for your DHCP clients.
6. Enter the Maximum Lease Time in seconds for your DHCP clients.

6.1.4.3 Add Dynamic Address Assignment

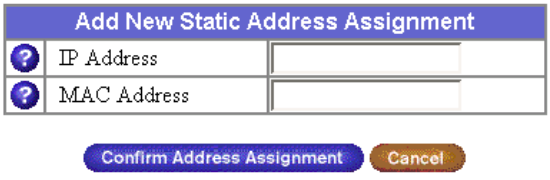
1. Click the **Add Dynamic Address Assignment** button.



2. Add a range of IP addresses to automatically assign via DHCP.
3. Click **Confirm Address Assignment** to save or Cancel to return to the previous screen.
4. Entries appear in the Dynamic Address Table.

6.1.4.4 Add Static Address Assignment

1. Click the **Add Static Address Assignment** button.



2. Enter the Static IP address you would like to automatically assign via DHCP.
3. Enter the MAC or hardware address of the machine you would like use the Static IP.
4. Click **Confirm Address Assignment** to save or Cancel to return to previous screen.

Entries appearing in the Static Address Assignment List can be modified by selecting the pencil icon, or deleted with the trashcan icon.

6.2 Server Upgrades

Medweb offers continual updates and upgrades to its server software and plugin software that are easily accessible via the Internet.

For server-to-server, secure routing, both servers must have the same version of software. The current version number can be found on the top right hand corner of the View Patients Page.

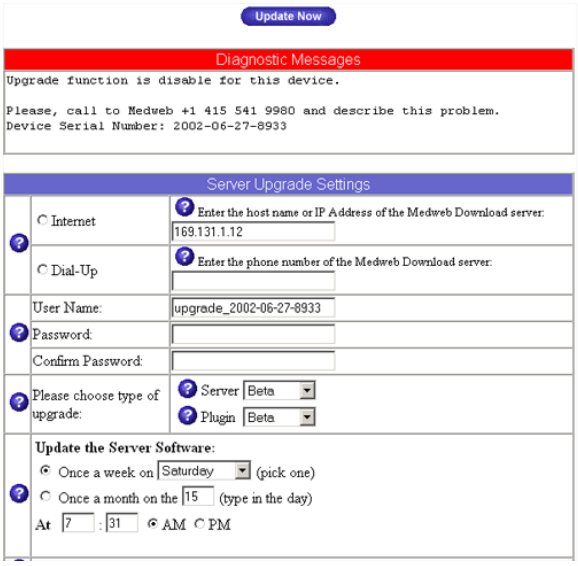
6.2.1 Upgrading the Server

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the Control Panel button and then click the Upgrade Server button on the top of the screen.

3. Enter the host name or IP Address of the download server. If external Internet access is not permitted, make sure that the server is pointing to upgrade.medweb.net. If the server does not have access to a DNS server, the IP Address for the Medweb upgrade server is 169.131.1.12.

To upgrade a server that is behind a firewall, the server can access our upgrade server using port # 873 and port #22.


Update Now
Diagnostic Messages
Upgrade function is disable for this device.
Please, call to Medweb +1 415 541 9980 and describe this problem.
Device Serial Number: 2002-06-27-8933
Server Upgrade Settings
Internet
Enter the host name or IP Address of the Medweb Download server:
169.131.1.12
Dial-Up
Enter the phone number of the Medweb Download server:
User Name:
upgrade_2002-06-27-8933
Password:
Confirm Password:
Please choose type of upgrade:
Server Beta
Plugin Beta
Update the Server Software:
Once a week on Saturday (pick one)
Once a month on the 15 (type in the day)
At 7 : 31 AM PM

4. Leave the username and password as they appear in the text fields. A password is not needed for this option.

5. Choose type of upgrade server software and plugin software. The default option is Beta for both the software and plugin upgrades. These versions contain the latest enhancements.

6. Click the Upgrade Now button to commence the upgrade(s). Watch the log window at the bottom of the screen for messages. Once the server reboots, the upgrade has been completed.

6.2.1.1 Scheduling Upgrades

There is an option for regularly scheduled upgrades that may be programmed to run at a specific time; once a week or once a month. The server can also automatically check for updates and send a notification to the Administrator when available.

6.2.1.1.1 Diagnostic Messages

Any errors before or during the upgrade will appear in a Message Box at the top of the screen. See below for an example.

Diagnostic Messages
Upgrade function is disable for this device.
Please, call to Medweb +1 415 541 9980 and describe this problem.
Device Serial Number: 2002-06-27-8933

6.3 Access Rights

This section will provide the Administrator with complete control over the access rights of the Medweb server. Click Save Changes once any modifications are completed.

1. User Add and Remove
This option allows anyone to self-register as a user and to remove his or her own account from the server. This minimizes the workload of the administrator. This option requires the administrator to create and remove registered users. This increases the workload of the administrator, but also controls the number of people who can use the resources of the server. This is the default.

2. Public Site Access (i.e. /cobalt/)
The Public Site contains a powerful search engine, and links to users and groups. Open mode allows anyone with network access to the server to access and search user and group pages. The server home page contains user and group information. Choose restricted mode to make information that is stored on the server accessible only to registered users.

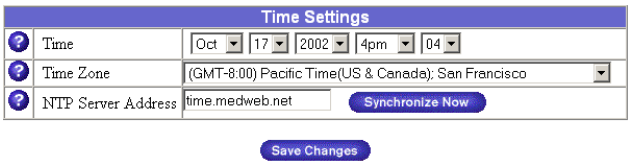
3. Install CGI Scripts
This option allows users to generate CGI-based dynamic web content. Only the administrator can install CGI scripts on the server. This increases security, but adds workload for the administrator because only he/she can install CGI scripts.

4. Telnet Access
The telnet server is turned off completely by default. Since telnet access may be insecure, this option is the safest choice. Telnet access is intended for developers and advanced system administrators only. Only the root user may telnet to the server. This option provides limited telnet access. The root user and all registered users can telnet to the server. Use this option to give all server users telnet access.

6.4 Time Settings/Synchronizing

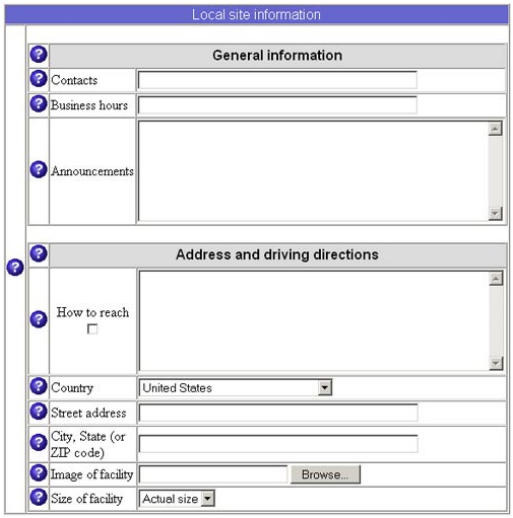
In order for email to function properly, you must set the time and date on the server. Use the pull-down menus to enter the values appropriate for your server. The Medweb server will check the accuracy of its time each night. Enter the host name or IP address of the server that will provide the precise time.

Currently you may use time.medweb.net to synchronize your servers. This feature is useful when many Medweb servers are being used to forward images using the timed forwarding feature. Save Changes after any modifications.



6.5 Local Site Information

This section is used to place any general information that will appear on the public page. Contact Names, business Hours, phone numbers, e-mails, faxes, pagers and other useful info. Save Changes.

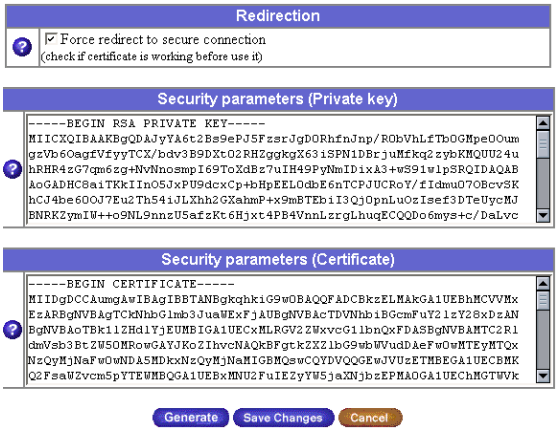


6.6 Services

6.6.1 Web Services

The Web service is always running, making it possible to connect with a browser.

1. Go to Administrators Site – Control Panel
2. Click **Parameters** to modify Web Server settings.



3. Redirection: Select the check box to force all web connections to the server to use secure connection.

4. Security Parameters (Private Key): Paste your secure connection (SSL) Private key here.

5. Security Parameters (Certificate): Paste your secure connection (SSL) certificate here.

6. Click **Generate** to generate a new Private Key and Certificate based on your Site Information.

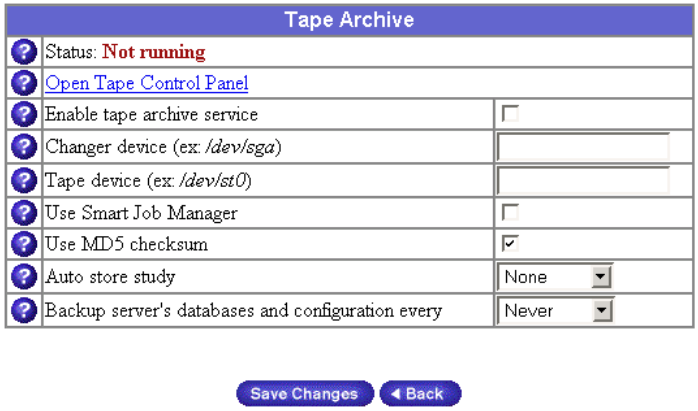
7. Click **Save Changes** to save or Cancel to return to the previous screen.

6.6.2 DICOM Server

The DICOM Server is always running, making it possible to transport DICOM images (Administrators Site –Control Panel).

6.6.3 DICOM Archive

This screen allows the management of image archive tools. That is, if you have any type of tape archive attached to your server.



1. Go to Administrators Site – Control Panel

2. Click **Parameters** to modify settings.

3. Status is reported
4. Click **Open Tape Control Panel** to manage archive jobs via the Tape Control Panel.
5. Select the check box to enable **Tape Archive Service**.
6. Enter the path for a tape-changing device attached to the server.
7. Enter the path for a single tape device attached to the server.
8. Select the check box to enable **Smart Job Manager**, which will sort archive jobs to maximize tape drive performance. Unchecked will archive jobs in the order they were requested.
9. Select the check box to enable **MD5 checksum**, which will check the integrity of the archive. Unchecked will not check integrity, but will decrease archiving time.
10. Select an option to enable **auto-storage** of a study. Default is 'none' for no auto-storage. **On Arrive** will archive the study when it is received, **On Delete** will archive the study before deleting.

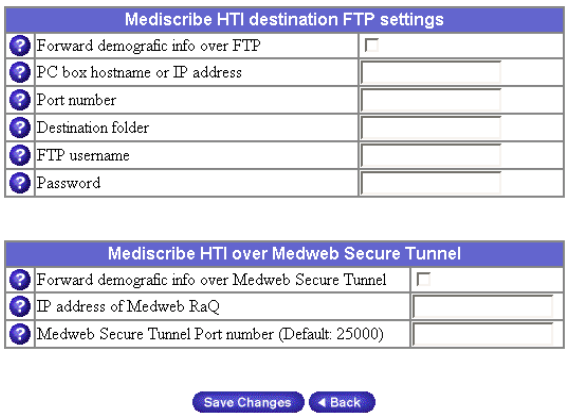
11. Select an option to enable backup of study databases and configuration files. Default is 'none' for no backup of these items. Other options include daily, 2nd day, weekly and monthly schedules for backup of these items.
12. Click **Save changes** to save or Back to return to the previous screen.

6.6.4 Mediscribe HTI

The Medweb server can integrate with HTI's *Mediscribe* server to provide transcription services. Mediscribe is a proprietary medical records software solution designed for medical transcription, report distribution, and workflow improvements for use by hospitals, clinics, physicians, transcription services, and managed care organizations.

1. Go to Administrators Site – Control Panel

2. Select the check box to enable support for Mediscribe HTI. Click **Parameters** to set up the Mediscribe function.



3. Select the check box to forward Mediscribe demographic information via ftp.
4. Enter the IP address of the ftp server.
5. Enter the port number for the ftp server.
6. Enter the destination folder on the ftp server.
7. Enter the FTP username and password information.

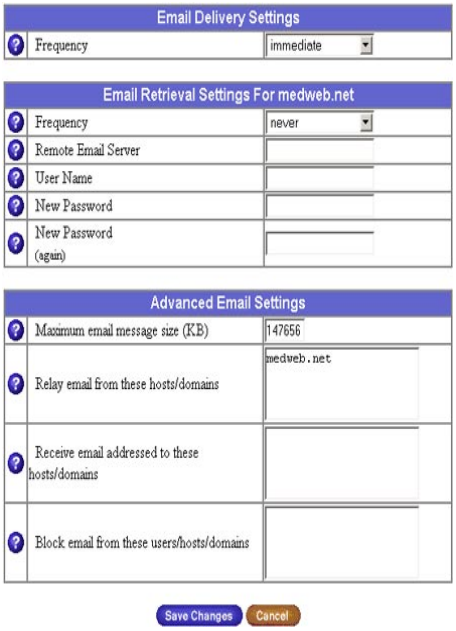
---Secure Tunnel vs. FTP
8. Select to forward the information via the secure tunnel as opposed to ftp.
9. Enter the IP address of the Medweb server.
10. Enter the Secure tunnel port number; default is 25000.
11. Click **Save Changes** to save or Back or return to the previous screen.

Be sure to select the check box on the Control Page beside the Mediscribe HTI section. This will "enable" this service. Click Save Changes at the bottom of this page after any services have been modified.

6.6.5 Email Settings

1. Go to Administrators Site – Control Panel

2. Select the check box to enable email serving. Click **Parameters** to configure the parameters for the Email Server.



3. Select the frequency for server mail to be delivered from the localhost to remote servers.

4. Select the frequency for the server to check a remote server for mail directed to users on the localhost.
5. If you have arranged with your ISP to retrieve your entire domain's email from a single mailbox, specify the appropriate server here.
6. Enter the user name for authentication on the remote server.
7. Enter the password (twice) for authentication on the remote server.
8. Enter the maximum size for an inbound or outbound email.
9. Enter the names of any and all domains, networks or hostnames, which wish to use this server as a relay for outbound mail. Your own domain is listed by default.
10. Enter the names of any and all domains that wish to receive email on your server.
11. Enter the names of any and all domains from which you wish to block receipt of emails.
12. Click **Save Changes** or Cancel.

A few notes for the Network Administrator and the Server Administrator about Email:

Use this service for SENDING MAIL ONLY. We do not recommend using the Medweb server for receiving mail.

Requirements: - A domain name that is valid in the DNS server for the site.

- The service must be activated: checked in control panel, and settings saved.

- An MX record in the DNS server configurations that will validate the sending address of the email.

Notes: - An email server may reject incoming email due to its size or an invalid return address.

- The plugin may be sent with a study or the study may be sent on its own if the plugin is already loaded on the mail-recipient's machine.

- If there are problems opening the MWW study in IE, save the study to the disk and select to open it in IE.

6.6.6 File Transfer Protocol (FTP) Server

1. Go to Administrators Site – Control Panel
2.Select the check box to enable FTP on your server. Click **Parameters** to configure the FTP server options.
3. Select 'Off' or 'On' for Anonymous FTP
4. If selecting 'On', enter the allowed incoming file-size and the number of simultaneous anonymous FTP users.
5. Click **Save Changes** or Cancel.

6.6.7 Windows File Sharing (SMB)

1. Go to Administrators Site – Control Panel
2 Select to enable support for Windows SMB, which allows Windows Users to access your server's files on the Windows 'Network Neighborhood'.
3.Click **Parameters** to configure SMB parameters
4.Enter the NT workgroup or Domain to connect to
5. Select to enable the server as a central authentication server for a network of Windows 95. Any machine logging onto a Windows 95 network will be authenticated on the DICOM server by username and password.
6.Select to be a WINS server on your network or enter the IP address of the WINS server on your network, if you have one. If not, leave the IP address field empty.
7. Click **Save Changes** or Cancel.

6.6.8 Apple file Sharing (AppleShare)

1. Go to Administrators Site – Control Panel
2. Select to enable support for AppleShare, which allows MacOS users to access server files on their desktop.

6.6.9 FrontPage Server Extensions

1. Go to Administrators Site – Control Panel
2. Select the check box to enable support for FrontPage, which allows web pages created by the Microsoft FrontPage application to be installed on the server.

6.6.10 Simple Network Management Protocol (SNMP) Agent

1. Go to Administrators Site – Control Panel
2. Select the check box to enable SNMP Agent.

6.6.11 Legato File Backup

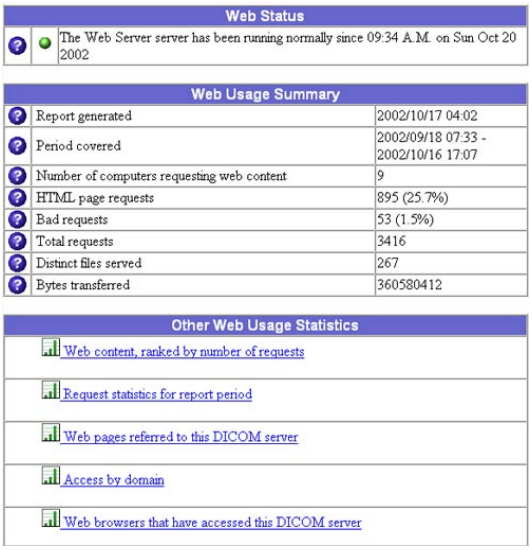
1. Go to Administrators Site – Control Panel
2. Select the check box to enable Legato File Backup.

6.7 Server Status

The Server Status page displays the current status of the Medweb server. A red light in the first row under **Web Status** indicates if there is a problem.

This page will provide information about:

- The date and time that the last web report was generated
- The time period or scope of the log file.
- The number of unique computers contacting this web server. It gives a rough idea of how many different people viewed web content on this DICOM server. Note: Multiple computers behind a firewall or a proxy server will count as only one address.



Web Status

The Web Server server has been running normally since 09:34 A.M. on Sun Oct 20 2002

Web Usage Summary

Report generated	2002/10/17 04:02
Period covered	2002/09/18 07:33 - 2002/10/16 17:07
Number of computers requesting web content	9
HTML page requests	895 (25.7%)
Bad requests	53 (1.5%)
Total requests	3416
Distinct files served	267
Bytes transferred	360580412

Other Web Usage Statistics

Web content, ranked by number of requests

Request statistics for report period

Web pages referred to this DICOM server

Access by domain

Web browsers that have accessed this DICOM server

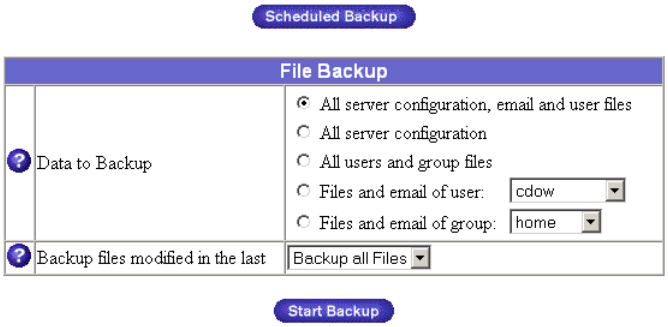
- The number of requests of .html files. A web page can consist of multiple .html files.
- When people request non-existent files, the DICOM server generates a bad request. This category also includes malformed requests and other erroneous requests.
- The total of all requests and the total number of bytes served by the web server
- Number of distinct files served by the web server

6.8 Server Backup Configuration

Server backups are performed directly between the PC and the Medweb server.

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the Maintenance button and then click the Backup button on the top of the screen.



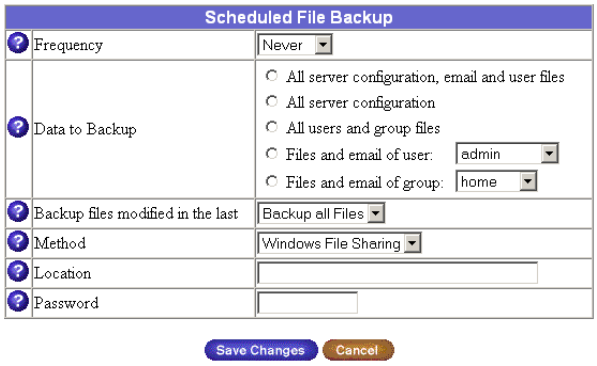
3. Several backup methods are available. Select the backup method that is appropriate and click Start Backup.

- All server configuration, email and user files
- All server configuration
- All users and group files
- Files and email of user
- Files and email of group

Incremental backups can be made of only the files modified in the last few days. Use the pull down menu to select which recently modified files will be backed up.

6.8.1 Scheduled Backup Configuration

1. Click the Scheduled Backup Button shown in the diagram above.



Frequency - Choose daily, weekly or monthly for how often the backup occurs. Choosing never will delete the current scheduled backup

3. Several **backup methods** are available. Select the backup method that is appropriate.

- All server configuration, email and user files
- All server configuration

- All users and group files
- Files and email of user
- Files and email of group

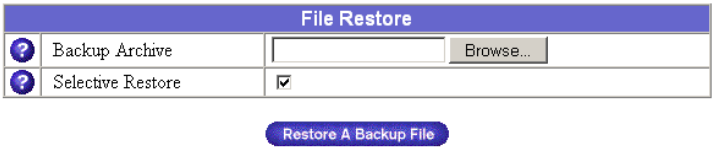
4. **Method** - NFS, Windows File Sharing, and FTP will write the backup file to a NFS resource, a windows share, or a FTP Server respectively. In all cases be certain that the target of the backup archives is available and has enough disk space. Failure to do so will result in truncated or nonexistent backup archives.

5. **Location** – Enter the location for the chosen backup method. Example FTP: user@ftp.domain.com. Example Anon FTP: ftp.domain.com/incoming Example NFS: server:/share, Example SMB: user@\\windowspc\share

6. **Password** - Enter the password associated with your method. This field is ignored for NFS and Anonymous FTP methods.

6.8.2 Restoring Backup Data

The server saves backed-up data in .qub files.



Use the Browse button to select the .qub file archived on the local computer that is to be restored to the server. Note that restore times can vary widely, do not to interrupt a restore as data could be corrupted.

Select the Selective Restore option to browse the archive contents to restore individual files. Click Restore a Backup File to complete the restore function. This may take a few minutes.

6.9 Resetting the Administrator Password

In the event of a necessary override, anyone may reset the Administrator password for the Medweb server.

Follow these steps:

1. Locate the Server and assure that the LCD Screen is facing you.

2. Push and hold the end of a paper clip in the recessed **Reset Password** button (See Section 3.0, Server Basics and Original Setup). Hold the button in for approximately 2 seconds.

The LCD Screen on the server should display:

```
Resetting admin
password...
```

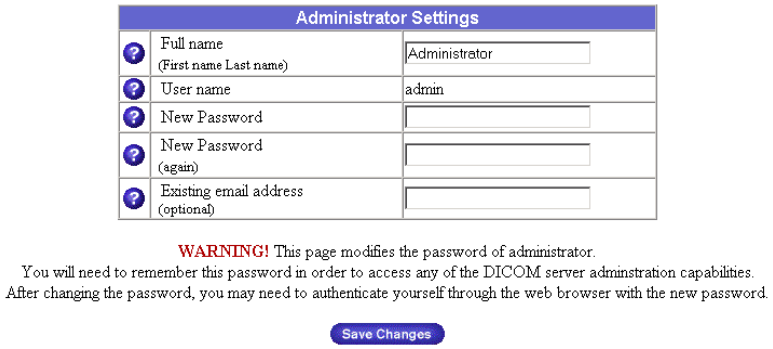
3.Release the Reset Password button.

4.Open your browser and enter the URL/name of your Site in the address bar.

5.If a prompt appears asking for a username or password, enter “admin” as the username. **DO NOT enter a password. Click OK.**

6.Go to Administrator Site by clicking the **Administrator Site** Button on the left hand side of the page.

7.The **Administrator Settings** table should appear.


Administrator Settings
Full name
(First name Last name)
Administrator
User name
admin
New Password
New Password
(again)
Existing email address
(optional)
WARNING! This page modifies the password of administrator.
You will need to remember this password in order to access any of the DICOM server adminstration capabilities.
After changing the password, you may need to authenticate yourself through the web browser with the new password.
Save Changes

8. Enter the user name as admin (if it is not there already), and enter the password twice to confirm. Click **Save Changes** button to save the changes. After the password has been reset, enter a new one as soon as possible to protect the security of the Server.

7.0 DICOM

One of the Medweb Server's most useful functions is the ability to securely route a copy of relevant DICOM studies securely across the Internet, Satellite Networks or congested, low bandwidth networks. The Server also lets you specify which DICOM devices support the query function, so that you can select and retrieve studies from them via the server's browser interface. When you load the optional VRE (Virtual Radiology Environment) software on the Server, you can securely route studies and balance the workload between radiologists or sites located across a wide area network or the Internet.

7.1 Optimized Network Transport and Image Compression

In addition to Wavelet compressed files viewed through the web browser, the Medweb server also provides 5 Types of Network optimization for file transfers over the DII or the Internet. These Five components combine to greatly reduce the impact that medical image transfers have on the network. They also allow transfer to occur over significantly reduced network bandwidth that otherwise would not support medical imaging traffic. These types of network transport are as follows:

1. Self-Recovering File transfer protocol.
2. Lossless or Lossy File compression
3. Satellite optimized/Congested network optimized transfer
4. Time delayed File transfer
5. Wavelet compressed secure web access

7.1.1 Self-Recovering File Transfer Protocol

The DICOM protocol that is used to transfer medical images across an Ethernet LAN between medical devices was never designed to work across a wide area network. As a result, if there are any lost packets in a file transfer, the protocol tosses all sent packets and restarts from the beginning of the study. This has a significant negative impact on the network.
The Medweb server greatly reduces the network bandwidth requirements of medical file transfer by accepting DICOM studies locally, then converting them to a self-recovering transfer protocol that is tolerant of network interruptions and lost packets. In this way, instead of sending multiple incomplete copies of a study, we send only one copy of the study and then simply send replacements for the specific packets that were not received. If the transfer is interrupted for several minutes, the Medweb protocol will pick up from where the transfer left off.
This component reduces network traffic by 3 to 5 fold over regular DICOM. All traffic is also encrypted. This does not impact positively or negatively.

7.1.2 Lossless or Lossy File Compression

The Medweb Server applies a minimum of 2.8:1 file compression to all studies that are sent between Medweb servers. Lossless compression on the Medweb server can shrink file sizes up to 10:1. Standard compression ratios are 3:1 for archival quality file transfers. **Lossy compression** is also used for extremely low bandwidth communications like 9600-baud satellite modems or POTS lines (Plain old telephone service). In this instance, Medweb uses state of the art JPEG2000 wavelet compression to shrink file sizes by 20:1 up to 100:1 depending on the imaging device that

is sending the data to the Medweb server. (Some types of images retain diagnostic quality at much higher compression levels than others). This lossy compressed file transfer can shrink a plain film from 30 megabytes uncompressed, to just 1 megabyte or less.

7.1.3 Satellite Optimized Network Transfer

The Medweb server does several things to optimize transport of images over high latency networks such as that experienced when sending data traffic over satellite links. The server does this by increasing packet size, and sending parallel data streams to reduce time waiting for acknowledgment packets and take advantage of idle bandwidth. The typical increase in speed of a file transfer caused by this component can be over 10X faster than attempting file transfers without the optimized network software.

7.1.4 Time Window Delayed Transfer/Timed Forwarding

The Medweb server is able to receive medical imaging studies from local DICOM modalities and cache the studies for sending during periods of Low network utilization. This means that if a facility has a particularly low bandwidth link, the Medweb server eliminates bottlenecks by holding the imaging studies until the end of the work day so that imaging file transfers do not interfere with interactive traffic like HIS (CHCS) sessions that may be going on over the same link during the day. The Medweb server can be set to send studies only during a particular time window. Furthermore, if network communications are only enabled during certain periods of time, the Medweb server will hold imaging traffic and start sending automatically when a remote network link is initiated. This may be useful for mobile facilities where a satellite network connection is only initiated for a few hours each day.

7.1.5 Wavelet Compressed Secure Web Access

By wavelet compressing studies that are viewed through a browser interface to the Medweb server, doctors are able to provide emergency or “stat” “wet reads” for patients in remote locations without impacting network bandwidth. In fact, this ability to securely access a wavelet compressed image over the net is simply not available through other techniques, but has a huge positive impact on patient care and the ability to quickly diagnose and treat life threatening injuries when they occur at remote locations.

7.2 Application Entity Titles (AE Titles)

It’s a two-step process to set DICOM routes, storage, query, or printing on the intranet or the Internet. First, you have to define the DICOM devices located on your intranet, and what SOP classes they support. Then you need to go to the AE Title routing page to set up routes between them.

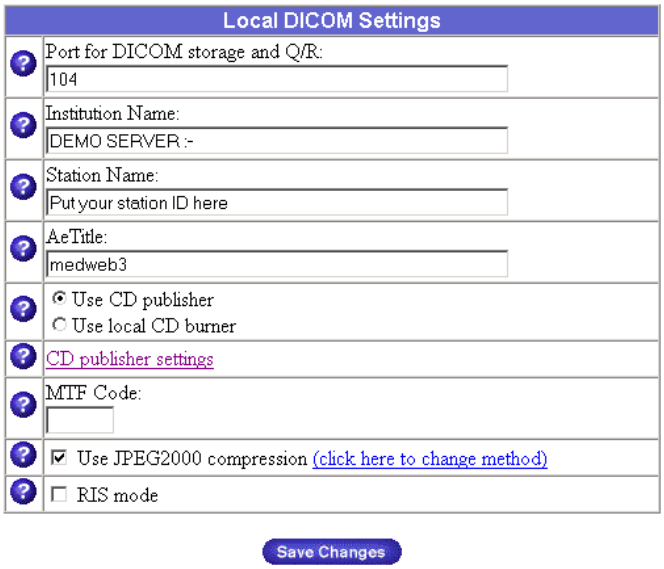
AE Title stands for "Application Entity Title." It is a standard DICOM field that you will use often when setting up the Server. Each DICOM device can support multiple applications performing various functions. For example, you may use one AE Title to access the storage class provider on a device, and a separate AE Title to access the query services of the same device.

7.3 DICOM Devices

The Server must be registered as a DICOM device for routing DICOM images. To configure the server, follow the steps discussed below.

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the DICOM Settings button.



The Server has a series of default settings that the Administrator uses to configure the DICOM devices. These are at the complete discretion of the Administrator and should be discussed prior to setup.

3. The server accepts connections on a predefined port. This port is usually 104. If the network communicates on a different port, change this field to the appropriate port number.

4. The hostname is the institution and the station name that the Server is associated with. Default settings for the station name is Medweb Server.

5. The default AE Title for the Medweb server is usually Medweb.

Note: When configuring multiple Medweb servers on the same network, each Medweb server must have a unique AE Title i.e. New York Medweb, Chicago Medweb.

6. CD printer settings can be configured if you have a CD Publisher attached. See Section 7.5.

7.The MTF Code (Medical Treatment Facility) is used solely by our Military Customers. It is a 4 digit Number.

7. Click Save Changes.

7.4 Setting DICOM Destinations

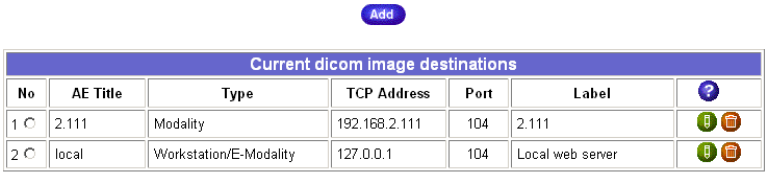
The DICOM devices must be registered as DICOM image destinations and must configured with the

server in order to effectively distribute and route images. Follow the steps discussed below to set up your DICOM devices.

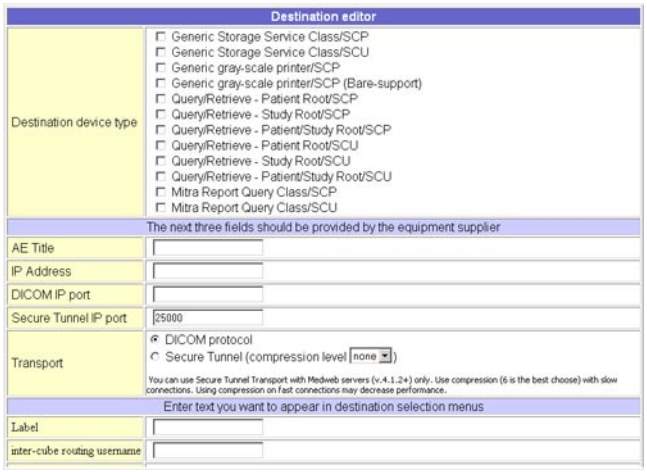
1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the DICOM Settings button.

3. Choose the **New Destination** button. The following table will contain any current DICOM image destinations.



4. Click the Add button to add to new destination.


Destination editor
Destination device type
Generic Storage Service Class/SCP
Generic Storage Service Class/SCU
Generic gray-scale printer/SCP
Generic gray-scale printer/SCP (Bare-support)
Query/Retrieve - Patient Root/SCP
Query/Retrieve - Study Root/SCP
Query/Retrieve - Patient/Study Root/SCP
Query/Retrieve - Patient Root/SCU
Query/Retrieve - Study Root/SCU
Query/Retrieve - Patient/Study Root/SCU
Mitra Report Query Class/SCP
Mitra Report Query Class/SCU
The next three fields should be provided by the equipment supplier
AE Title
IP Address
DICOM IP port
Secure Tunnel IP port
25000
Transport
DICOM protocol
Secure Tunnel (compression level none)
You can use Secure Tunnel Transport with Medweb servers (v.4.1.2+) only. Use compression (6 is the best choose) with slow connections. Using compression on fast connections may decrease performance.
Enter text you want to appear in destination selection menus
Label
inter-cube routing username

Please visit **Appendix A** for a description of all the DICOM SOP classes.

5. Select which of the DICOM SOP classes the particular device supports. For example, a CT scanner may only support the ability to transfer DICOM storage class studies to another DICOM device that knows how to accept them. In that case, you would select the second option, "Generic Storage Class SCU" (SCU stands for Service Class User).
In this case, the CT scanner is storage SCU, while the Server is a storage SCP (Service Class Provider).

Note: If selecting DICOM Print SOP Class, Select only one choice.

6. The next section contains the AE Title, IP Address and DICOM IP Port. This information should be supplied by the equipment supplier and configured by the Administrator. To select the AE Title, IP Address, and Port Number, do the following:

The administrator should supply the destination(s) with IP Addresses. The port number and AE Title should be provided from the various equipment vendors. The Administrator may make up the addresses of his/her own choosing, and then select the AE Titles and port numbers. Distribute these to

the various vendors and request them to enter the same addresses on their machines. The Label is a description to identify the device in the popup menu that appears on the patient study list selection screen of the Server.

7. If using a secure port, enter the specific port number and make sure the Secure Tunnel Button is checked. For more information on Secure Routing, refer to Section 9 Server Configurations for Secure Image Routing.

8. **Secure Tunneling** The Admin may select the compression level at which the files are to be transferred. A drop down list is shown with compression levels from Zero to Nine. Medweb recommends using compression (6 is the best choose) with slow connections. Using compression on fast connections may decrease performance. You must check the check box to enable the Secure Tunneling and Compression level.

9. If only accessing local DICOM devices with the Server, then there is no need to configure the Server-to-Server Routing functions. Leave these fields blank.

10. Select Scheduling parameters. The Medweb server is able to route and deliver the images immediately upon request or have them transferred at a specific time. This option is very helpful when you have multiple destinations routing large numbers of images to the server. For scheduled delivery, images may be sent to destinations for a particular time interval. The format for this is HH:MM [00-23] until [00-59]. Please enter the hours into the text fields provided.

11. Repeat this process for each DICOM device on your local intranet. Begin sending DICOM studies to the Server once all destinations have been added and configured.

The studies will appear in the patient menu and can be viewed from any browser-equipped PC using the Medweb Browser plugin.

If you would like the server to forward copies of studies it receives to other DICOM devices, read ahead to the section on the DICOM route editor. However, if you plan on using Multi-Server networks, route over the Internet, satellite, or wide area networks, then skip ahead to the section on Server-to-Server routing.

7.5 Configuring and Using the CD Publisher

7.5.1 Introduction to CD Publishing

This is a software/hardware option for the Medweb server. It allows authorized users to select cases from their Web browser to be recorded to a local storage device like a network CD Publisher. The studies are recorded as DICOM, or as self-playing Medweb files with an integrated Medweb Viewer Plugin. The ability to integrate a full-featured self-playing Medweb Viewer onto the CD adds a unique functionality that allows the facility to send patients outside the facility for consultation with an inexpensive electronic copy instead of printing film.

7.5.2 Rimage Software

Note: Please assure that the PC has a Firewire card installed before proceeding.

1. Install the Rimage Producer Software Suite and proceed through the wizard.
2. When prompted, be sure that **Client Applications** and **Servers – Just Production** are selected.
3. Be sure to choose the correct printer attached to your device, either the Everest or the Prism.

4. Finish Setup.

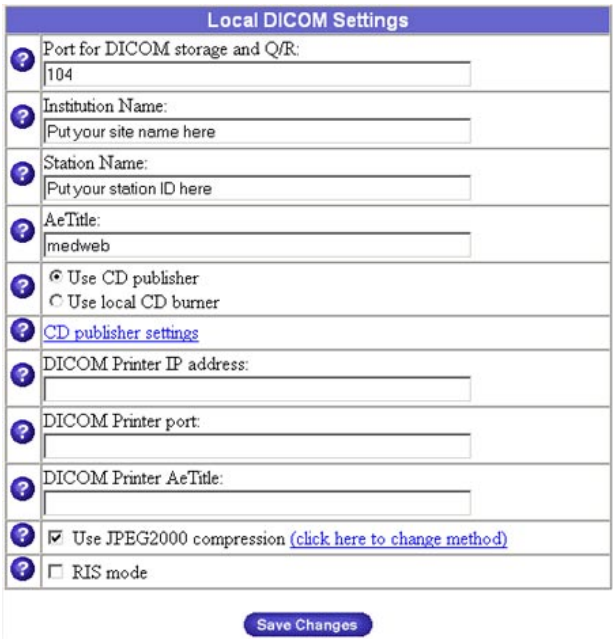
7.5.3 Medweb CD Gateway

The MedwebCDGateway.exe file will be required to process CD "orders" and is therefore necessary to download and install on the PC before proceeding. You may obtain this file by calling Medweb at 415.541.9980/1.800.8MEDWEB and a representative will provide you with instructions. Download and Install this program. Accept all defaults when installing.

7.5.4 CD Publisher Settings

1. Login to the Administrator Site of the Medweb server using the browser.

2. Select DICOM Settings on the navigation bar on the left of the screen.



3.Select the radio button beside either "Use CD Publisher" or "Use local CD Burner". A local CD burner is one that is located inside the PC. The CD Publisher is a separate unit and is usually a mass storage device and is capable of burning multiple CD's.

4. Click on the **CD Publisher Settings** link.

5. Enter the IP Address assigned to the CD Publisher.

6. The username and password will be **demo/demo** respectively.

7.Use the standard ftp port 21.

8. Save Changes

Once the CDGateway.exe file has been installed on the PC, and the DICOM settings have been completed, navigate to the **View Patients** page using the browser. Located in Image Management

Toolbar (Section 10.3), a CD icon should appear. This permits the user now to print studies to a CD, using an attached CD Publisher.

7.5.5 Starting the Publishing Process (for the Rimage only)

1. Start the Production Server software located in the Rimage Directory on the PC.

2. Start the Medweb CD Gateway on the PC.

3. Open the Production Server Gateway so "orders" to be processed can be viewed.

4. Login to the Medweb Server as a regular user and go to the **View Patients** Page.

5. Click the CD Icon in the Image Management toolbar for any patient listed in the table.

6. Check the PC Production Server to make sure the order is received by the CD Publisher. A "new order being processed" will be present.

7.6 Modifying or Deleting Destinations

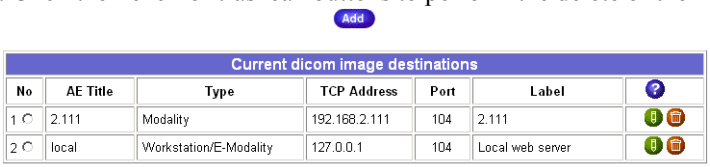
The Administrator may modify or delete any destination by using the Pencil and Trashcan buttons located beside each destination entry.

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the DICOM Settings button.

3. Choose the **New Destination** button. The table will contain any current DICOM image destinations.

4. Click the Pencil or trashcan buttons to perform the delete or the modify function.



7.7 DICOM Route Editor: AE Title Forwarding and Element Matching

The Medweb Server supports two types of forwarding mechanisms for DICOM images. They are AE Forwarding and Element Matching.

7.7.1 Application Entity Forwarding

AE Forwarding is accomplished by matching an AE against a known set of AE's. This is done once the Medweb Server receives a DICOM image. If the remote DICOM entity uses an AE that does not match the AE of the Server that receives the image, then the receiving server will assume that the image is to be forwarded to another remote DICOM entity. A copy of the image will remain on the initial receiving server even though the AE Titles did not match. This method is

used when you want to use a Server (or two Servers) as intermediaries in the DICOM transmission process. For instance, a conventional DICOM link would look like this:

Modality ---[DICOM]---> Archive

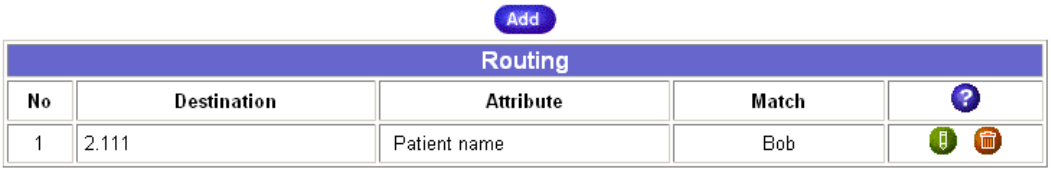
The link may be modified to this:

Modality ---[DICOM]---> Server ---[DICOM]---> Archive

Configure the modality to use the same AE as the archive, but the IP/port of the Server. Configure the Server to know about the archive device. Then once the server (with an AE that matches the archive device's AE) receives an image, the server will automatically forward to it.

7.7.2 Element Matching

To configure route paths go to Element Matching screen by selecting Administrator Page>DICOM Settings> AE Title Routing. The following screen appears.



The initial Server performs element matching once a DICOM image is received. Using the administrative user interface, the Server can be configured to look inside each DICOM image received and match that image against a pre-stored query. If the image matches the query, then the image is forwarded to a remote DICOM entity as specified. Use this when you want to use the Server (or two Servers) as a router. For instance, you may want to have the Server forward all head studies to a Neuro reading workstation(s), or all images from patients under a certain age to the pediatric reading workstation(s). Element matching works alongside of AE Routing. Thus, you can utilize the Server for both AE Routing an image and element matching an image at the same time. For instance, you may have a DICOM link between a modality and an archive that looks like this:

Modality ---[DICOM]---> Archive
You can use AE Routing to break this link like this:

Modality ---[DICOM]---> Server ---[DICOM]---> Archive

Then you can use element matching to extend the link like this:

Modality ---[DICOM]---> Server ---[DICOM]---> Archive

--[DICOM]---> Workstation1
--[DICOM]---> Workstation2
--[DICOM]--->Workstation3

1. To add a route, click the **Add** button.

2. Select the Destination for the Path, which could be the Local Server attached to DICOM

3. Choose the Attribute that will be the "key" element to route on, such as patient name, study date, referring physician etc.

4. Enter a Keyword for the attribute.

5. Click Save Changes.

6. Add as many routes as needed for DICOM Routing.

Direct DICOM Forwarding

Direct DICOM forwarding is the baseline forwarding mechanism. This is similar to the forwarding that was described earlier. Here the server acts as the center of multiple DICOM transmissions. For instance:

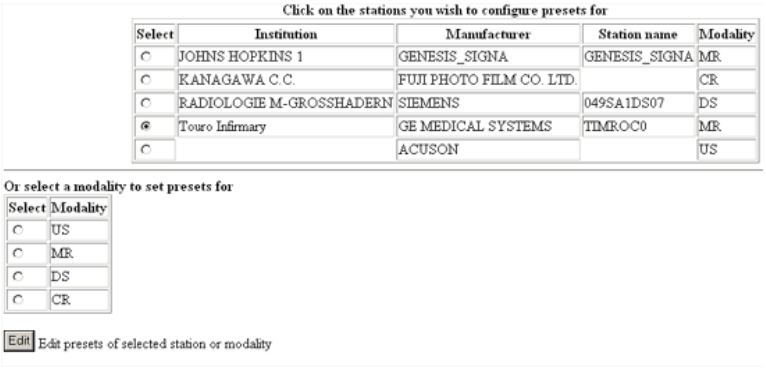
Modality ---[DICOM]---> Server ---[DICOM]---> Archive

Essentially, images arrive via DICOM into the server. The Server routes to one or more remote AE's using its local AE database and element matching (AE Routing) tables. There are a number of fields that you can route on when setting up intranet or Server-to-Server element based routing. These include all those listed in the following image:

7.8 DICOM Presets

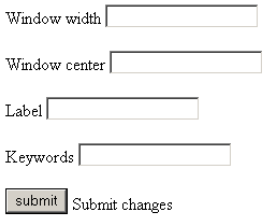
7.8.1 Introduction

Despite the fact that the DICOM standard provides a mechanism for forwarding Window/Level presets, certain DICOM devices fail to forward information concerning Window/Level settings as part of the DICOM file. When viewed on another DICOM device, the image may appear black at first. In order to view the image information, you will need to manually adjust the Window and Level settings. This process can be time consuming, so the Server takes advantage of descriptive information located in other fields to automatically apply the Window/Level settings to DICOM studies when they arrive. These settings are controlled in the "presets" submenu of the DICOM settings screen. This function may also be used to send pre-windowed wavelet compressed studies to on-call radiologists. For example, when viewing a head CT from a GE spiral scanner, you will also want to see brain and bone windows of the study. By using the presets function, you can have the study wavelet compressed as two sets of information, one using bone windows and the second using brain windows.



7.8.2 Configuring DICOM Presets

Window/Level presets depend on the sending device populating the descriptive fields in the study with information about the type of study performed. Certain vendors will populate the descriptive field with an English description of the scanning protocol used for the study. The Presets function on the Server will look for certain keywords in that description to decide what Window/Level to apply to the study. The Administrator may set the presets, or use some of the default parameters that are already programmed into the Server.



For example, for a brain CT, you can configure the presets window to look for the word “brain” in the Series Description field. When it finds the word “brain,” it will automatically apply brain and bone windows before displaying the images in the Web server. You can adjust the window and level default presets by changing the values in the window and level fields for a particular preset. These values are based on the same scale as is typically used by GE medical systems. There are standard conversions that allow you to translate these values into Hounds field units.

8.0 Security Setup for Secure DICOM Routing

8.1 Introduction

The Medweb server far exceeds HIPAA requirements, as well as having many security functions that are simply not available from other vendors.

Medweb has two fundamental methods for secure DICOM Image routing. They are:

- IPSEC VPN (Virtual Private Network)
- Application Specific Secure Proxy

The application specific secure proxy is the preferred method of routing DICOM images on congested networks, the Internet or Satellite links. The following document details the types of encryption methods that are HIPAA and HCFA compliant that Medweb uses to securely routes images within a network.

In addition to routing, the Medweb server has a built-in packet filter that may be used to disable access to all ports and services that are not specifically used by the server. This further enhances security functions of the server.

8.2 Secure Server Operation and Image Routing

8.2.1 Using the IPSEC VPN Function

IPSEC is **I**nternet **P**rotocol **Sec**urity. IPSEC uses strong cryptography to provide both authentication and encryption services. Authentication ensures that packets are from the right sender and have not been altered in transit. Encryption prevents unauthorized reading of packet contents.

IPSEC establishes a secure tunnel between two subnets (NET1 and NET2) over an unsecured communication such as the Internet. Everything passing through the un-trusted Internet is encrypted by the IPSEC gateway machine and decrypted by the gateway at the other end. The result is Virtual Private Network or VPN. A VPN lets two networks communicate securely when the only connection between them is over a third network, which they do not trust. The setup method is to put a security gateway machine between each of the small sites that only have limited traffic.

There is never a time when you will transfer from a Medweb server to another non-Medweb server over the Internet using regular DICOM. It violates HIPAA and HCFA regulations. The way to route to a remote PACS, or other DICOM device at a remote site is by putting a Medweb at each end of the Internet link. Medweb makes inexpensive cube servers for communicating networks and the un-trusted network. The gateway machines encrypt packets entering the un-trusted net and decrypt packets leaving it, creating a secure tunnel through it.

Further, Medweb does not permit sending DICOM over a WAN, only over the local Ethernet, and preferably only on the captive DICOM side of the Medweb Server internal firewall.

8.2.1.1 IPSEC Configuration

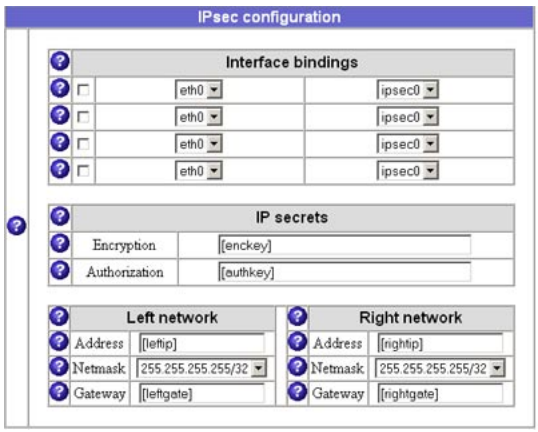
NOTE: In order to operate in secure mode, you must assure that you have closed any unsecured connections.

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the Control Panel button and then Click Services.

3. Locate IPSEC Administration from the table of Service Settings and click on Parameters.

The IPSEC Configuration page is divided into 4 Sections. To configure and bind the IPSEC Interface(s), follow the steps below.



4**. Interface bindings**
Eth0 and eth1 are network interfaces on the back of your server. Eth3 is a satellite network interface. Match the network interface to the IP SEC interface.

Check the **check box** on the side to enable the matched interfaces.

5. **IP secrets**
User should enter Encryption and Authorization. The values are to be long strings and may be the same or different. These parameters should be the same for both ends of tunnel (NET1 and NET2); therefore communication between both Administrators is necessary.

6. **Left network - Right network**
Provide the network configuration for both ends. Left is the local end of tunnel and the Right is the remote end.

7.Click Save changes.

8. Return to the Services Page and Check the box beside IPSEC Administration and click Save Changes.

This will start the IPSEC tunnel at one end. The remote end (receiving end) must configure the same settings in order to properly establish a secure connection.

8.2.2 Secure Tunneling – Routing DICOM Studies

8.2.2.1 Application Specific Secure Proxy Tunnels

Secure tunneling uses Secure Shell transport for study routing/forwarding between Medweb servers. It also can compress data to increase speed on slow networks.

This communication channel will work between Medweb's devices ONLY. Both Servers must also have the latest version of the Software to ensure compatibility.

8.2.2.2 Secure Tunneling Configuration

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the Control Panel button and then Click Services.

3. Locate Medweb Secure Tunnel from the table of Service Settings and click on Parameters.

4. **Secure Tunnel IP Port / Default Value: 25000**
This is the service/communication port number. Assign any port number that is not assigned to another service. The same port must be open on the firewall/router to enable communication.

5. **Localhost Public Key**
The Public Key of local host Server must be copied and pasted in the remote host's server. This allows the remote host to accept studies from the local host.

6. **Known Hosts Table**
The Public Keys of any remote hosts to should be stored here.

To add a new Remote Host: Click Add and copy the Public Key of the remote host and paste it in the Box. Click Save Changes.

7. Go back to the Services page and check the check box beside Secure Tunneling.

8. Proceed to DICOM Settings on the Navigation Menu and Select Destinations at the top of the page (at the source server).

9. Click Add.

10. In the Transport line, specify the same port number to use Secure Tunnel.

11. Select the compression level (1 is the lowest and 9 is the highest).
Note: Use compression on slow networks, using compression on fast network will slowdown overall performance.

8.2.2.3 Scheduling Transfer Times

The Medweb server is able to route and deliver the images immediately upon request or have them transferred at a specific time. This is very helpful when you have multiple destinations routing large numbers of images to the server. For scheduled delivery, images may be sent to destinations within a particular time interval or transfer window, set by a Medweb Administrator. For configuration details, refer to Section 8, DICOM Routing.

8.2.2.4 Network Optimization for Image Transfer

In addition to Wavelet compressed files viewed through the web browser, the Medweb server also provides five types of network optimization for file transfers over the Internet.

8.2.2.4.1 Setting Compression Settings for Image Transfer

Please refer to Section 8, DICOM Routing for more information on configuring Compression Settings for DICOM.

8.2.2.5 Secure Tunnel Step-By-Step

- Upgrade both Servers with the latest version of Software.
- Exchange public keys between servers

- Assign a port number
- Save Changes
- Check Secure Tunnel check box on Services Page
- Save Changes
- Go to DICOM SETTINGS /DESTINATIONS
- Add destination and same port number as the source server
- Save Changes
- Commence the transfer from the source server

8.2.3 Workflow Proxy

8.2.3.1Workflow Proxy Introduction

The workflow proxy function is only used for encryption of listed ports. IPSEC encrypts everything between sites but workflow proxy encrypts only a partial part of traffic and leaves rest of it unencrypted. Let us suppose that Device A generates data and sends it into device B over port 3320. If we use both device A and B inside a corporate network we don't have think about security and encryption as much if it was two devices on different sites.

8.2.3.2 Example of Workflow Proxy

Lets say we have two distinct sites, Novgorod (A) and San Francisco (B) and we want to provide an encrypted tunnel for communication of a particular device at each site. A proxy will need to be created between the two devices. The proxy will consist two new devices (servers) Proxy on the A (PA) side and Proxy on the B-side (PB).

PA will listen on port 3320 and will encrypt and forward data from the A device into PB which will decrypt the data and forward it onto device B. Device A will communicate directly with PA and will "think" that it is communicating with device B.

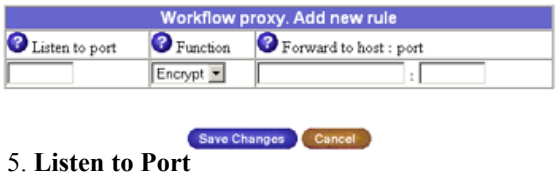
8.2.3.3 Configuration of First (A) Workflow Proxy (Based on Example in 8.2.3.2)

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the Control Panel button and then Click Services.

3. Locate Workflow Proxy from the table of Service Settings and click on Parameters.

4. Click Add Rule.



5. **Listen to Port**

Specify the port to listen to at Local Host. Make sure you have an open connection at this port. Ex: port 1111

6. **Function**
Specify the function. Since this is the local host and you are sending the data, you should choose Encrypt. This will encrypt the stream and forward it to remote host : port.

7. **Forward to Host : Port**
Specify host : port. This is the target or remote host. This way the encrypted stream goes to the address at host : port. For example 199.199.199.199:2222

8.2.3.4 Configuration of Second (B) Workflow Proxy (Based on Example in 8.2.3.2)

Specify the port to listen to at localhost. This is should be 2222, because we are forwarding here from the first Server.

1. Select Function = Decrypt

3. Specify the host : port. This is the target host (B) with server application i.e. a PACS broker.

Remote A: Listens to 3320 for request then encrypt and forward to Hub A: 199.226.64.197:5520
Hub A: Listens to 5520, decrypt and forward to work flow source at 192.168.64.43:3320

8.2.4 IP Filters

8.2.4.1 IP Filters Introduction

IP Filters are like a built in firewall. The Medweb device can store a list of filtering rules and process every incoming/outgoing data packet and either allow it to go on or drop it. This is very useful in protecting hosts inside corporate networks.

8.2.4.2 Resetting IP Filters

The wrong configuration of IP Filters can make a device unreachable. To reset IP Filters select Menu RESET FILTERS from the LCD panel on Server console.

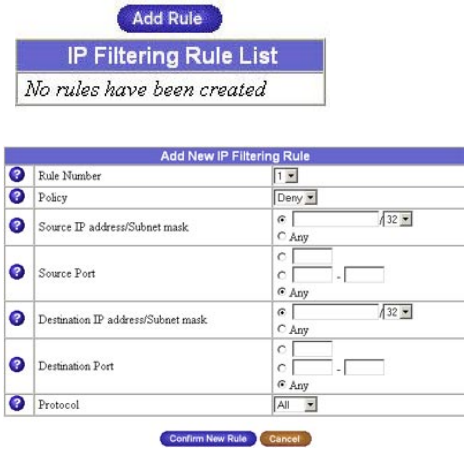
Also, in the Secure Operation tab, if you enable all of the services, you will overwrite any customized filters. You must then go back to customize your filters once again.

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the Control Panel button.

16. Click IP Firewall at the top of the screen.

4. Click Add Rule to add customized filters.



5. **Role Number**

IP filtering rules are numbered. Rules with smaller numbers are tested first. For example, an IP packet will not test against rule 2 if rule 1 filters it out.

6. **Policy**

Policy determines whether packets meeting the criteria of this rule are accepted or denied. Accepted packets are allowed to pass unfiltered through the server. Denied packets are dropped from the server.

7. **Source IP Address**

The IP address and subnet mask of the host or network are where the IP packet is originating. If the subnet mask is 32, then the IP address specifies a single host.

8. **Source Port**

Packets originating from this port or range of ports will be filtered.

9. **Destination IP Address**

The IP address and subnet mask of the host or network are where the IP packet is destined. If the subnet mask is 32, then the IP address specifies a single host.

10. **Destination Port**

Packets destined to this port or range of ports will be filtered. For example, port 80 is the HTTP port, port 21 is the FTP port, and port 23 is the telnet port.

11. **Protocol**

Select the protocols the rule to which it will be applied. Select all for all protocols. To select just two protocols (e.g. TCP and UDP), you need to have two separate rules

8.2.5 Secure Operation - SSL

8.2.5.1 SSL Introduction

Secure Sockets Layer (SSL) allows an SSL-enabled server to authenticate itself to an SSL-enabled client, and allows both machines to establish an encrypted connection. SSL-server authentication allows a user to confirm the identity of a server. The “sockets” part of the term refers to the

sockets method of passing data between a client and a server program in a network or between program layers in the same computer.

SSL-enabled client software can use standard techniques of public-key cryptography to check that a server's certificate and public ID are valid and have been issued by a certificate authority. This process is identical for authentication of the SSL-client.

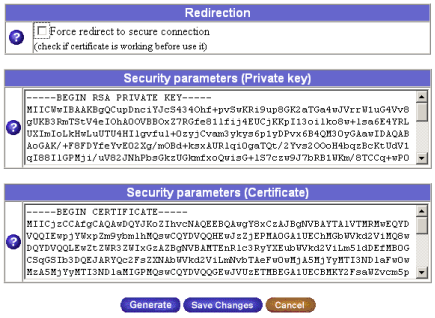
The Medweb Server allows for secure operation if needed. A force redirection of your public and Administrator Sites to a secure connection is possible by simply providing your demographic information and generating a security certificate.

8.2.5.2 SSL Security Certificate Generation

1. Sign on to the Medweb Server and login using as the Administrator.

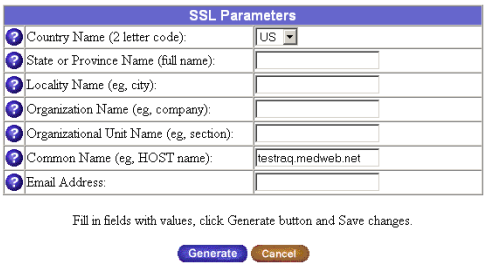
2. Click on the Administrator Site button on the Navigation Menu. Click the Control Panel button and then Click Services.

3. Locate Web Server in the table of service settings and click on Parameters.



4. Check the check box to force secure connection.

5. Click Generate.



6. Fill in demographic information and click Generate again**.**

7. Once redirected back to the Redirect Page, click Save Changes.

Medweb provides the means to enable all ports for services (such as Web, FTP) and Medweb ports. It overwrites the last IP filter rules and enables the **Automatic redirection to Secure HTTP access for Public and Admin site**, as well as other services.

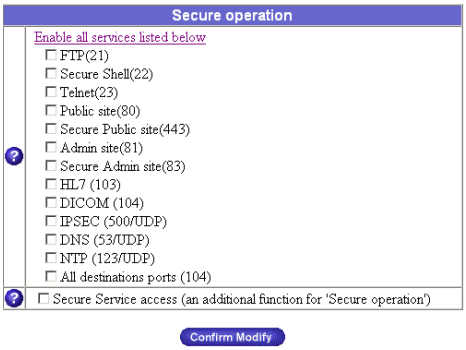
8.2.5.3 Enable all Ports Configuration

The Secure Operation page of the Medweb Server is the fastest way to enable the services you will need.

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the Administrator Site button on the Navigation Menu. Click the Control Panel button and then Click Services.

3. Locate Secure Operation at the top of the screen and Click the button.



4. Click Enable all services list below.

5. Click Confirm Modify.

6. After clicking Confirm Modify, go to IP filters page and re-customize your IP filter rules.

9.0 Procedures for Viewing Studies

9.1 Medweb Image Viewer Plugin

9.1.1 Introduction

The Medweb Plugin is a unique, patented, clinical imaging viewer that is designed to work in conjunction with Internet browsers, e-mail programs, or as a stand-alone application. The plugin has many of the software viewing tools of a high-end DICOM radiology workstation, however it is less than 1.5 megabytes in size. You can send the plugin via an e-mail message, along with image studies. The plugin allows a consulting doctor to view and manipulate the images using only a conventional Windows PC or Macintosh computer. The following section is a description of the myriad of tools and functions contained in the plugin.

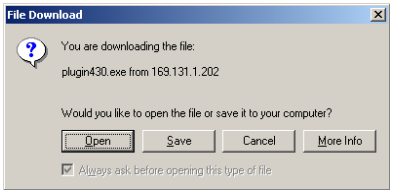
9.1.2 Plugin Installation

To download the plugin for the first time or if you want to upgrade your version, please follow the directions below.

1. Sign on to the Medweb Server and login using as the Administrator.

2. Click on the **View Patients** button on the Navigation Menu. Locate the Get **Latest Plugin** button at the top of the screen and click it to proceed to the following page.

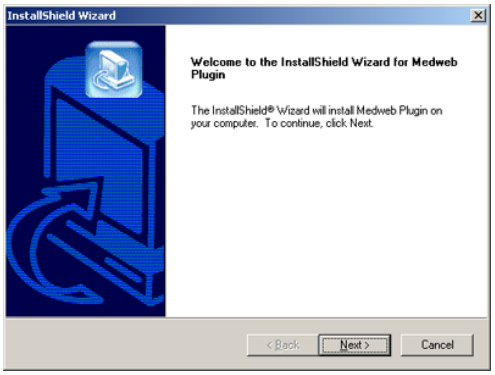
3. Listed are the latest versions of the Medweb Plugin for Windows, Macintosh and Linux operating systems as well as downloads for Medweb Smart Monitor and the CD Gateway. Click the appropriate icon for your operating system.


File Download
You are downloading the file:
plugin430.exe from 169.131.1.202
Would you like to open the file or save it to your computer?
Open
Save
Cancel
More Info
Always ask before opening this type of file

4.The above screen will appear. Select a location on your hard drive to save the file. The download should take only a few minutes. Please make sure all instances of the Browser are closed. It is best to download when all programs are closed.

5.Once the download finishes, select Open from the Window Prompt or go to the location on the local hard drive where you saved the file and double click it to run the wizard installer.

6. The Medweb Image Viewer Installer will appear.


InstallShield Wizard
Welcome to the InstallShield Wizard for Medweb Plugin
The InstallShield® Wizard will install Medweb Plugin on your computer. To continue, click Next.
< Back
Next >
Cancel

7. Click **Next** to proceed with the installation. Read and accept the terms of the Medweb Agreement and Select Typical Installation. Continue to choose **Next**.

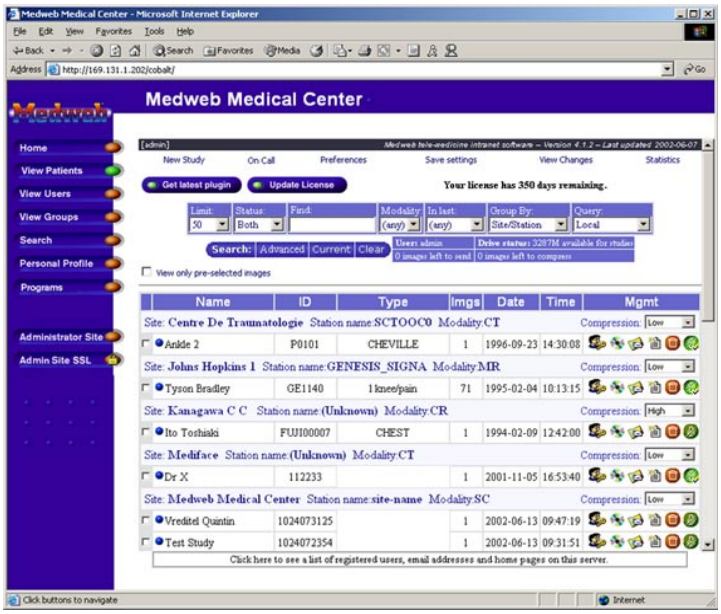
8. Click **Finish** to finalize the installation and a page describing the latest changes to the Medweb Plugin will open automatically.

9. Reopen your browser and sign into the Medweb Home Page and Select View Patients.

10. You may now view patient images using our Medweb Viewer. Refer to Section 15. 3 Patient Study Information and Manipulation.

9.2 View Patients Page

The View Patients page provides a convenient method for selecting and viewing patient studies that are stored on the Server or on DICOM devices located on the same network.



9.2.1 Management Toolbar

Beginning with the management toolbar, this section takes you through the functions of the View Patients Page. See figure below.

9.2.1.1 New Study

The New Study option opens a blank instance of the Medweb Image Viewer Plugin allowing you to create a study from scratch by uploading images to the server. Medweb has incorporated Twain and digital camera interfaces into the plugin to allow the capture of images from devices such as digital cameras, video scopes and scanners. Please refer to Appendix A for examples of

compatible TWAIN devices. The New Study features allows you to convert any uploaded images to DICOM for forwarding to a DICOM archive as well as create a new study and add images to an existing study.

9.2.1.1.1 Creating a New Study

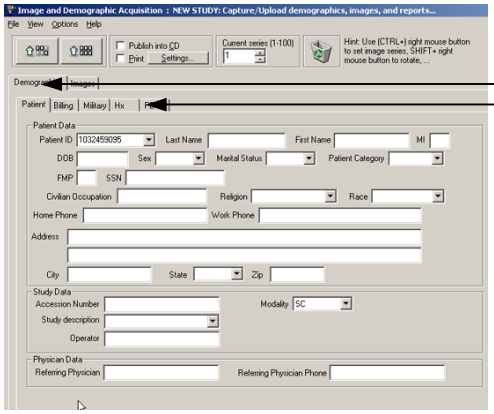
1. If you are adding images to an existing study you must first select that study and open it (Refer to Patient Study Management if you have not installed the Plugin).

2. Select the Acquiring Twain Images/Camera Icon from the plugin toolbar.

3. If you are creating a new study then simply click the New Study Button in the Management toolbar (Pictured above).

4. To create a new study you must enter the patient demographic information before uploading images. If you are simply adding images to an existing study then the patient information should appear in the text boxes.

After entering the patient information, use the brief forms to enter additional data for billing information, medical history, and physical exam data by clicking on the appropriate tabs. This provides a quick and easy way to create new studies from scratch without having to connect to DICOM or HL7 driven systems.



Demographic and Images Tab

Billing Information, Medical History, Physical Exam Tabs

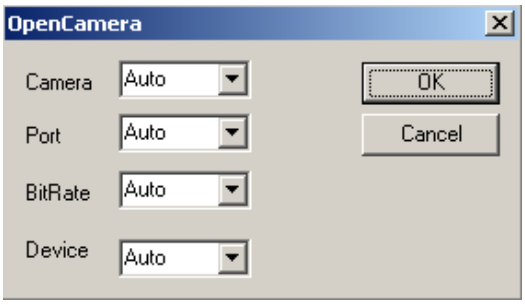
5. Once you have finished entering the demographic data proceed to the Images tab.

9.2.1.1.1.1 Acquiring Images from a Kodak Digital Camera

1. Please make sure the camera is turned on, is in connect mode, and is plugged into the serial, USB, or set for infrared communication with your PC.

2. To connect the camera simply click the Connect Camera button in the Digital Camera tab.

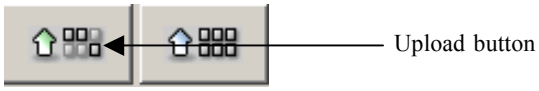
3. Use the pull down menus in the Open Camera Window (below) to configure your camera settings. Click OK.



4. Click Download Thumbnails to download the images from the camera. The images appear in the bottom panel of the screen in what is referred to as "thumbnail" size. You may double click an image to view a larger version.

5. Select the images that you would like to add to the study by dragging and dropping them into the upper panel (the window above the one you are viewing the thumbnails in).

6. At this point, you can select the Upload button, to transfer the images to the Medweb server.



9.2.1.1.1.2 Acquiring Images from TWAIN Devices and Scanners

1. To connect to the TWAIN device or scanner, simply click the Select Source button in the Scanner (TWAIN) tab. A screen appears that lists the devices currently connected to your PC.

2. Highlight the device from which you want to transfer the images and click Select.

3. Click the Acquire button to acquire the image. The control dialog box for the particular TWAIN device you have selected pops up on the screen. (The TWAIN protocol allows you to download the TWAIN interface directly from the device or load floppies that come with the device).

4. Using the interface for your device, select and capture the image. The thumbnail image appears in the lower panel. Repeat the same steps to acquire more than one image.

5. Once all images have been captured, drag and drop each image from the lower pane into the upper pane.

6. Click the Upload button (shown below) to upload these images onto the server.

NOTE: The plugin displays a progress indicator that shows the images being uploaded to the server. When it is completed, the progress indicator disappears and the plugin display window appears with the new images displayed in the study window. If no images appear in the study window, make sure that the On Call function is Enabled. For instructions, see below.

To upload images from VIDAR, EKG and Spiro, please follow the same instructions mentioned in the Acquire Images Section.

9.2.1.1.1.3 Special Note on Using the Vidar Scanner TWAIN Drivers

In order to acquire TWAIN images from a VIDAR scanner, it is important that you follow a specific order for loading software drivers.

1. Load your PC with a narrow, 50-pin SCSI interface from Adaptec.
2. Load the Adaptec software, which comes with your SCSI interface card.
3. Load the VIDAR TWAIN drivers.
4. Load the Medweb Plugin
5. Start the browser and navigate to your Home site.

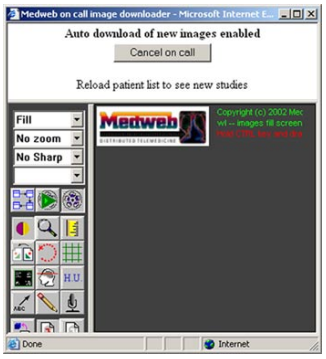
Loading drivers in the wrong order, or attempting to use a wide SCSI or ultra-SCSI interface instead of the 50-pin narrow SCSI, may result in error. The scanner may not operate or possibly may not even be recognized by the system.

9.2.1.2 The On Call Function

Enable the On Call function to allow the automatic download of images that arrive on the server from imaging modalities onto your patient list.

9.2.1.2.1Configuring On Call

Click the On Call button in the Management toolbar to see a small version of the plugin window display on your desktop. To cancel the auto-download of images, click Cancel on call



IMPORTANT NOTE:

Do not use this window to view patient images. This window is used **ONLY** to enable or disable the On Call function.

9.2.1.3 Preferences

The preferences menu allows a User to set personal preferences such as your name, email address, and contact information. Click the Preferences button on the Management toolbar. Click Submit to save any changes.

9.2.1.4 Save Settings

The Save Compression Settings button allows the user to select per-modality compression settings when accessing images from inside the same network. Please refer to Compression Settings under Section 15.3 Study Information and Manipulation for more information.

9.2.1.5 View Changes

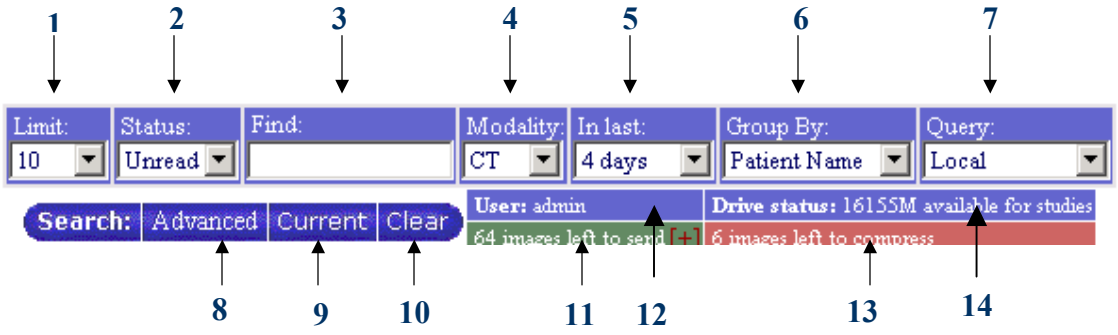
The View Changes button displays the recent software updates and version numbers. It outlines what has been changed and how many fixes were performed. Click the View Changes button on the Management toolbar to access this information.

9.2.1.6 Statistics

The Statistics page details the rate at which a host may access studies. If you click View Full Web Statistics, you may also view information about users accessing the studies, such as IP Address of the user's machine, username, studies viewed, and actions performed.

9.2.2 Study Search Bar

Use the Search Bar when trying to locate a particular study that no longer resides in the Patient List, locating studies on another server attached to yours or trying to locate all studies grouped by a particular physician or other parameter (More search options are described below).



1. **Limit:** Limit the number of studies to be returned by the search query
2. **Status:** Select to return only those studies that are either read, unread or both.
3. **Find:** Use any identifiable word here to narrow down your search. I.e. Smith (last name of patient)
4. **Modality:** Return only those studies that are of a particular modality.
5. **In Last:** Use this to set the time frame for your query. I.e. retrieve only those studies dated within the last four days.

6. **Group By:** Use this feature to group your results and the way they are displayed in the patient list.
7. **Query:** Select a location to query. I.e. search your local server or any attached server to return requested studies.
8. **Advanced:** This will launch a more detailed query/search page to search for studies.
9. **Current:** Clicking this button will return the search parameters to their fields that were used to display the current results in the patient list.
10. **Clear:** Clicking this button will set all search fields back to their default values.
11. This field will display the number of images left to send. This option is only available to those servers who are currently set up for forwarding.

    By clicking the [+], a new browser window will appear. A table will display the Server destination AE Title, the Sending (Routing) AE Title, the number of files, and the total size.

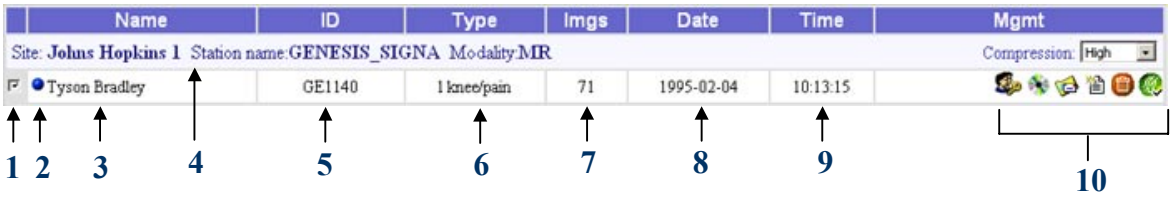
    This table lists all studies currently queued for transfer.

Refresh
Close
Dest.AE Scheduled Router.AE Files Size Mgmt.
1 medweb2 Now medweb2 (192.168.2.207:104) 65 8.19 M
Status: Last transfer 02/04/2003 11:43:33 - sent via DICOM 132132 bytes to AE medweb2
Total: 65 8.19 M
Refresh
Close

    Note: In the example above, the server was both the sending and the receiving device.
12. **Users:** Displays the name of the user current logged in and using the View Patients Page.
13. This box displays the number of images currently left to compress. This occurs when studies are being sent to the destination server and after being received, they are compressed so that they may be viewed and stored. This field will be blue if no images are waiting to be compressed/received.
14. **Drive Status:** This field indicated the amount (in MB) of local drive storage currently available.

9.3 Study Information and Manipulation

9.3.1 Viewing a Study



Refer below for Descriptions.

1. Read/UnRead
Click this check box to mark a study as Read.

2. View a Patient Study
Click this blue ball to launch the patient study in the Medweb Image Viewer Plugin.

3. Patient Name
This field will populate the name of the patient.

4. Study Origin
This is provides information about the Site, Station and Modality where the study originated.

5. Patient ID
Each patient is assigned a unique ID number within the system.

6. Type
This field describes the type of injury incurred by the patient.

7. Images
This field represents the number of images contained within a study.

8. Study Date
This field contains the date the patient study was entered.

9. Time
This field contains the date the patient study was entered.

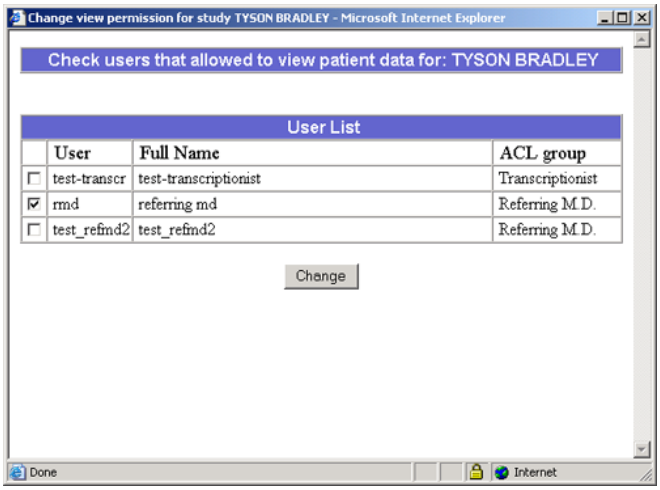
10. Image Management Tools

9.3.1.1 Image Management Tools

Change Access Permissions

This icon allows the Administrator to assign particular users to access patient studies.

Only an Administrator may change ACL permissions for a user and he or she may assign multiple users to a study. A new window will open by clicking this icon. It will display all users registered on the server as Referring M.D. or Transcriptionist. These are the only 2 ACL Groups that only have access to studies assigned to them (as opposed to all studies in the patient list).

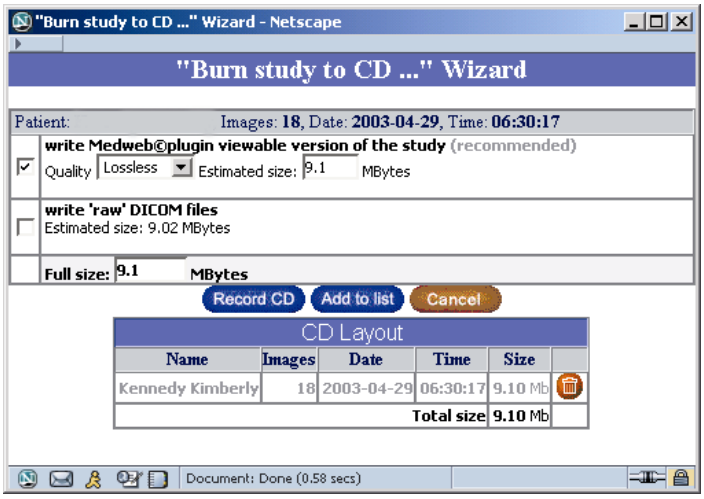


To modify or add users to a particular study, check the check box adjacent to the user you would like to remove or add.

Click **Change** to save your changes.

Print Study to a CD – Create Self-Playing Patient CD

Click this icon to publish a study to a CD. A DICOM printer or a CD Publisher must be attached to the server for this to function (See Section 10, Configuring your CD Publisher)



Select to publish a Medweb viewer compatible image format (this option will copy the Medweb plugin on to the CD as well) and/or raw DICOM files to CD by checking the check box (es). Click **Record CD** to begin creating the CD.

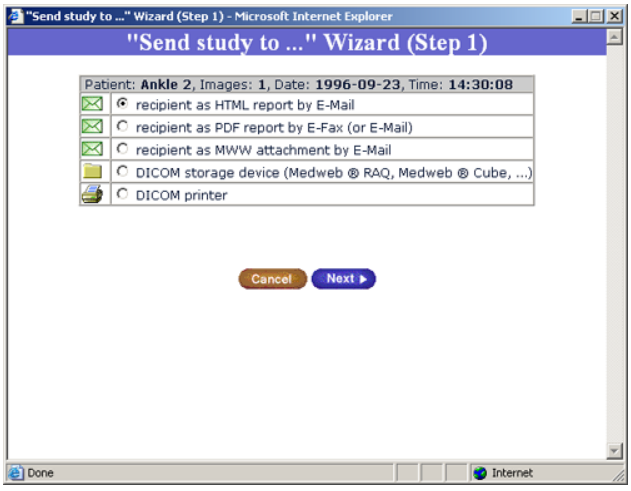
Burning Multiple Studies
This feature permits copying multiple studies to a single CD.

Select the CD icon adjacent to the desired patient study. Select to burn Medweb viewer compatible image format and/or raw DICOM files by checking the check box(es).

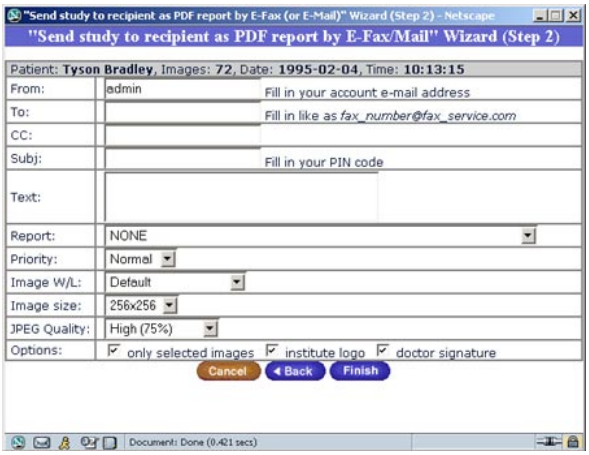
Click the **Add to List** button and the selected study will appear in a table as shown in the above diagram. To add multiple studies, go back to the Patient List and click the CD icon of the next study to be added to the CD, click Add to List in the new window and that study will appear in the table below the previous study. You may continue to add studies until the **Full Size box** indicates less than or equal to 650MB (or 700MB depending on you CD capacity). All studies will appear in the table.

A new window is opened each time a study is selected for burning. The windows maybe closed (using the X in the right corner) and the studies will remain on the list. If you plan on burning multiple studies, it is a good idea to close the window after you have added it to the list, that way you do not have too many windows open after you have added all the desired studies.
To remove a study, at any time, click the **trash can** icon beside the undesired study to remove it from the list.

Send to DICOM storage device, printer or by Email and Fax
Send patient images to a recipient via email or fax, to print the images to a DICOM printer or to send the study to a local or remote storage device.


"Send study to ..." Wizard (Step 1) - Microsoft Internet Explorer
"Send study to ..." Wizard (Step 1)
Patient: Ankle 2, Images: 1, Date: 1996-09-23, Time: 14:30:08
recipient as HTML report by E-Mail
recipient as PDF report by E-Fax (or E-Mail)
recipient as MWW attachment by E-Mail
DICOM storage device (Medweb ® RAQ, Medweb ® Cube, ...)
DICOM printer
Cancel
Next ▸
Done
Internet

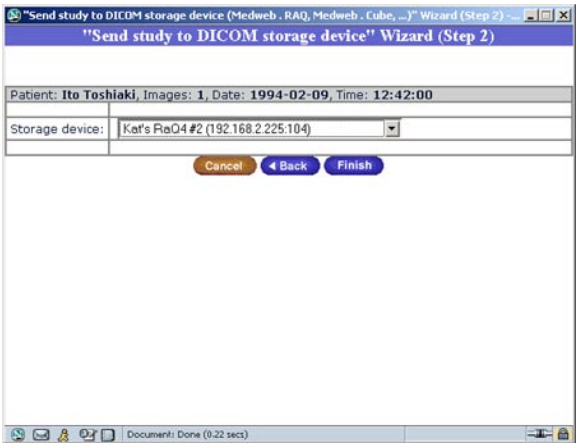
This screen will appear:



Fill in the fields with the appropriate personal information.

When sending as HTML and/or PDF, the jpeg size and quality (low, medium and high) may be modified. When using MWW format, a copy of the Medweb plugin is sent attached to the email a choice of format in which to send it (Windows, Linux etc) is available.

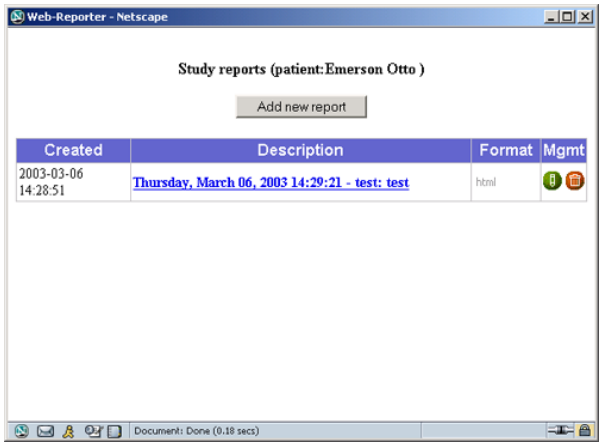
2. To send to a **DICOM Storage Device**, select the button to enable sending the study to a DICOM storage device, Click **Next.**


"Send study to DICOM storage device (Medweb . RAQ, Medweb . Cube, ...)" Wizard (Step 2) -...
"Send study to DICOM storage device" Wizard (Step 2)
Patient: Ito Toshiaki, Images: 1, Date: 1994-02-09, Time: 12:42:00
Storage device:
Kat's RaQ4 #2 (192.168.2.225:104)
Cancel
Back
Finish
Document: Done (0.22 secs)

Any devices (Medweb RaQ/Cube) that are currently registered on your server, as Query/Retrieve DICOM Destinations will appear in the drop down menu. Select the device (Medweb RaQ/Cube) in the menu and click Finish. The study is now sent to the receiving Medweb server! (To add a Medweb server as a destination, See Section 8.4 Setting DICOM Destinations.)

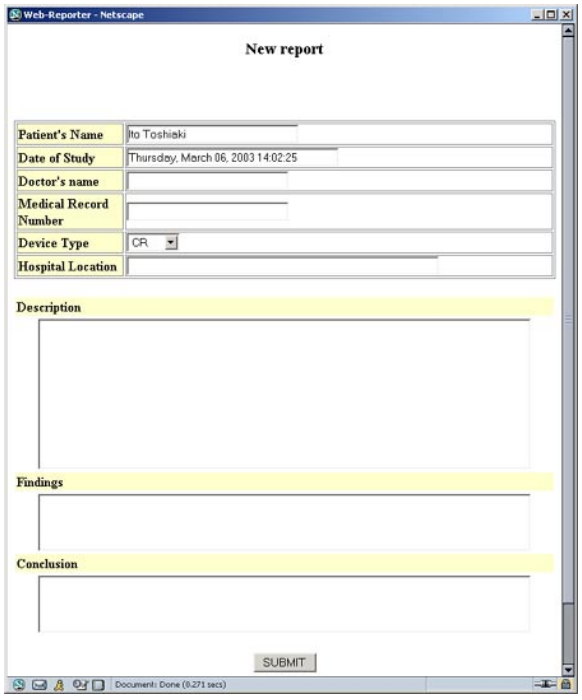
3. To print to a DICOM printer, the printer must also be registered as a DICOM destination. See above.

Add, Modify or View Web Reports
By clicking this icon, a screen will appear with any current web reports for this study. Any reports will appear in this table.



To open a report, click the desired item.
To delete a report, click the **Trashcan** icon beside the report to be deleted.
To edit a report, click the **Pencil** icon, make the edits necessary, and click **Submit**.

To add a report, click **Add Report** and enter the information in the text fields.



Fill in the appropriate fields and click **Submit** to create the report. The report will now appear in the report window.

Adding Word Documents as a Report:

1. Open the study using the Medweb Plugin.
2. Select the image, and Drag (highlight) the desired file Drop it anywhere on the image.
3. A prompt will appear requiring the user to label the report name. Click Ok.
4. The Word document will now appear ion the list of reports and can be opened deleted or modified from the Report window.

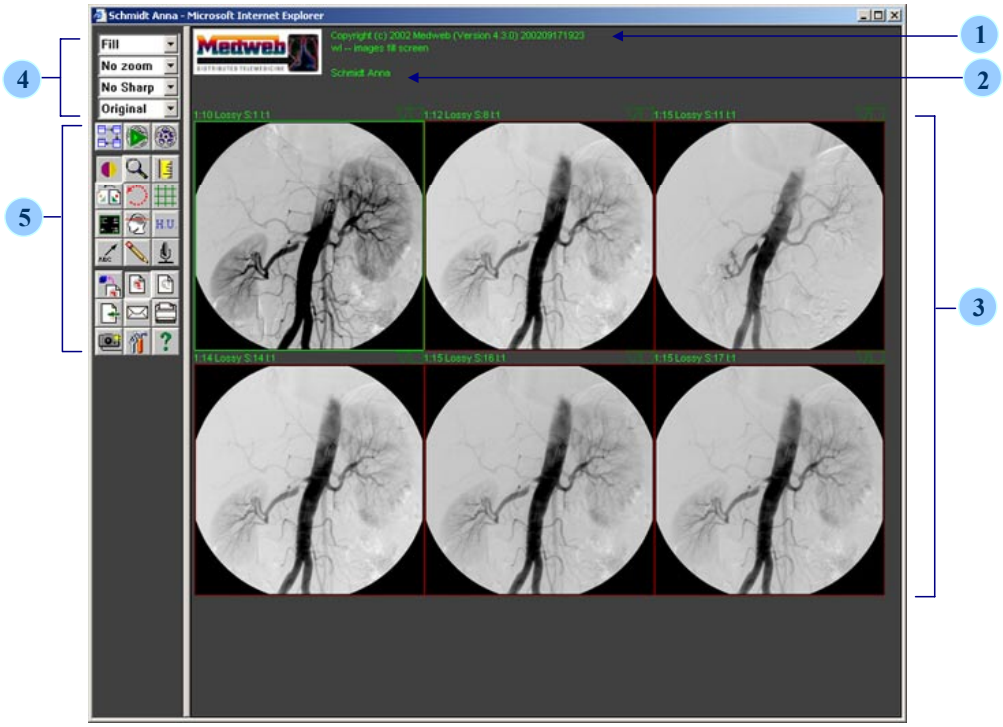
Delete Study
This will permanently delete a study from the server.

Hold/UnHold Study
Holding a study will prevent it from being deleted from the server. Upholding a study will permit the server to delete the study when the space is needed.

Compression Settings
The administrator may change the compression level of images. Use the drop down menu to adjust the compression level for a particular study. To save per-modality compression settings, click Save settings at the top of the screen. Any images routed from that modality type will be compressed at the level specified.

9.4 Plugin Tools/Image Manipulation

This section will describe the manipulation tools in the Medweb plugin. Please see below.



1. Plugin Version
The current version of the plugin will be clearly typed in green in all instances of the Medweb Plugin.

2. Patient Name
The Patient name is indicated in green at the top of the screen.

3. Images
All of the images contained within a study will display in a tiled format upon opening the plugin. The size of the images will depend on the number of images contained within the study. For example, the more images in the study, the smaller they display in the window.

4. Menus

Viewing

Use the first drop-down menu, in the top left to adjust the number of images that preview on the screen. Selecting **Fill**, which is the default; will populate all images contained with a study on the plugin screen. True will display an image in the size it was originally captured. Select the number of images you would like to view at one time by choosing a number between one and seven.

Zoom
Use the second drop down menu to choose your level of Zoom. The zoom level chosen is applied to all images currently displayed in the window. You may select a specific image by clicking on it and then choosing a zoom level. You may then apply that zoom level to all the images by simply clicking on the image once to proceed to the next image. You may change the zoom level at any time.

Digital Edge Enhancement

Use the third menu to help sharpen the borders and edges of an image. This tool is useful only for 12 bit images, such as chest X-rays and abdominal films. The level of enhancement increases from Sharp 1 being the least amount of enhancement and Sharp 4 being the greatest. Conversely, Smooth 1 and Smooth 2 will soften or smoothen the image, in effect performing the reverse function as Sharp. To enhance an image, select the image by double clicking it and select the desired level of sharpness or smoothness.

Window Level Defaults

Use the fourth menu to restore the original image to the screen or to backtrack one by one through the changes that were performed.

5. Tools

Window Layout
The user may set the layout of all images contained within a study. The images may be tiled horizontally, vertically, or 4x4. Cloning the Plugin window will create two separate windows for viewing the same study. Linking the window will reflect any changes done

in one window, in the other.

Cine Auto Playback Multi-Frame
This plays back DICOM multi-frame objects, such as ultrasound clips. The PC must have the adequate RAM and processing speed to display the correct timing. A window allows the user to select the rate at which the images are played. Reclick the cine button to release the CINE function.

Cine Stack
Cine modes stacks all of the images in a study one after the other. Use the right mouse button to advance through the images and the left mouse button to backtrack. Reclick the image to release the CINE stack function.

Window Level
The Window Level/Invert allows the user to see different parts of the image in detail by gradually changing the level of black and white in the image. Invoking the Window level function automatically invokes CINE, so use of the CTRL key is necessary. While holding down the CTRL key, move your mouse, with the left button pressed, across the image and the levels will change.

Magnify/Zoom
The magnifying glass creates a zoomed area that can be dragged over any part of an image to magnify it. Upon clicking the magnifying glass button, select a level of magnification from the drop down Zoom menu in the left hand corner. You may move the Magnification box around the image with your mouse. You must however hold down the CTRL key to move the box. The magnification box will disappear if the CTRL key is not depressed.

DICOM Measurement
DICOM measure uses information sent from the DICOM device to provide measurements in millimeters (mm). Select the image; hold down the CTRL key and drag the mouse over the section to be measured (using the left mouse button) and the value will appear in mm. The measurement device will not work if the CTRL key is not depressed.

Image Mirror
This function will mirror the image as it appears in the window. To return the image to its original view, click the mirror button a second time.

Rotate
This tool rotates the images in a counterclockwise direction at 90 degree increments.

Measurement Grid
The measurement grid displays a grid of 1cm squares over the image. This is useful when you zooming images and you want to have a relative measurement tool.

Adding Text Overlay
This tool displays image demographic information such as patient name, hospital, image size, ID number etc. You may click the button a second time to have the text disappear.

Scout Locator
The scout locator function allows the user to view the perpendicular slices of the entire DICOM, MR or CT study.

Hounsfield Units
This tool allows you to show or hide Hounsfield units for a CT study. The value is an averaged value in a circle with a radius of 12 image pixels.

Arrowhead
The arrowhead tool is used to label a particular region of interest on an image. Hold down the CTRL key to drag the arrow in the direction you would like to annotate, release the mouse button and a text window will appear. Type the desired text in this window and

press ok.

Freehand Annotation
The freehand annotation tool allows the user to draw on any image. Hold down the CTRL key and use the mouse (left button) to draw on the image.

Record Annotation
This records dictation, sound files from Doppler-Ultrasounds as well as heart oscillations. Clicking this button will launch a recording window. To commence, press Record. To playback, press Playback. When finished, upload the annotation by clicking the upload annotation button (below).

Upload Annotations
Once any annotations have been recorded, or any text inserted the user may upload a copy of the study to the server. Upon clicking the upload button, the user will be prompted to save the file. The server will label the file with the user's name, date and the annotations assigned.

Show/Hide Annotations
This allows the user to show or hide annotations within a study.

Clear Annotations
The user may clear any annotations that have not yet been uploaded to the server. Once on the server, the user may not delete them.

Save Images locally
The user may save any image, group of images or a complete study to the local hard drive as a jpeg file.
Once clicked, a window will appear where the user will choose to send one image, a group of images or the whole study, and the location on the hard drive where the image is to be stored.

Email Images
The user may also email any image, group of images or a complete study. A window will open prompting the user to fill in an email address, text and whether or not to send a copy of a self-installing version of the Medweb Plugin so the recipient may view the image(s).

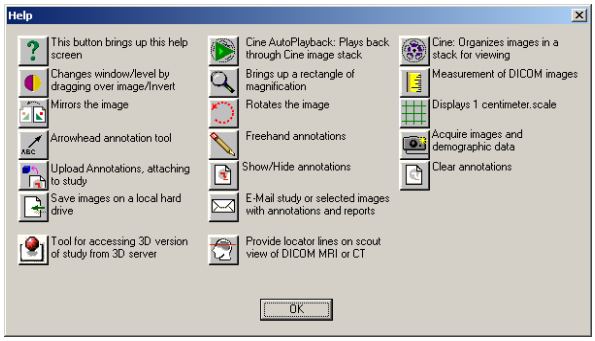
Print
The print tool will print a selected or group of images with the patient name, date and time and any other textual information (annotations) the user selects.

Acquire Images
The acquire images tool allows the user to add a new patient study and will open a blank New Study Window.

Plugin Preferences
The plugin preferences tool allows the user to customize plugin defaults. The DECODER tab allows the user to set the modality, the number of download steps and the image quality for each step. Medweb recommends that the second step of progressive downloading be set to 40% or more. The CACHE tab stores studies in the cache to increase performance. The user may select the cache location and set size restrictions. In the SECURITY tab, Medweb suggests checking the "Clean cache before exiting", which will delete the temporary storage of information.

9.41 Supplementary Help Tools

9.4.1.1Plugin Help Screen


Help
This button brings up this help screen
Changes window/level by dragging over image/Invert
Mirrors the image
Arrowhead annotation tool
Upload Annotations, attaching to study
Save images on a local hard drive
Tool for accessing 3D version of study from 3D server
Cine AutoPlayback: Plays back through Cine image stack
Brings up a rectangle of magnification
Rotates the image
Freehand annotations
Show/Hide annotations
E-Mail study or selected images with annotations and reports
Provide locator lines on scout view of DICOM MRI or CT
Cine: Organizes images in a stack for viewing
Measurement of DICOM images
Displays 1 centimeter.scale
Acquire images and demographic data
Clear annotations
OK

The plugin will also display “tool tips” in red at the top of the plugin window. Also, if the image has reports or annotations previously attached, the user may view them by clicking on the Reports, Annotations and Demographics buttons at the top of the plugin window

In the top right hand corner of each image, are a triangle and a square highlighted in green. This is a secondary method to accessing all of the plugin tools by clicking the triangle. The image may also be marked or unmarked by clicking inside the square. This serves as an indicator and will “mark” the image for further viewing.

10.0 The Medweb RIS and Web Scheduler

10.1 RIS Introduction

The Medweb RIS™ is an HL7 compliant web-based Radiology Information System that is fully integrated into the Medweb All-in-One™ Server. This system can receive orders from any standard HL7-based Hospital Information System (HIS). Once the orders are received, they are listed in the integrated web scheduler. From the convenient web scheduler, the department or imaging center can add, delete, or change appointments individually or as a block of appointments. The integrated RIS and web scheduler provide complete DICOM worklists and workload tracking throughout the department or imaging center.

Advanced features allow referring physicians to schedule patients from their office with appropriate restrictions. Blocks of time on various machines can be reserved for specific physicians or groups so that the imaging center can subcontract time slots to other vendors.

10.2 RIS Basics

The Medweb RIS and integrated web scheduler is a supplementary software component of the Medweb server. Its primary functions are:

- Management of patient orders
- Scheduling of DICOM modalities/machines
- Displaying orders received from HIS

The Process:
1. Create Order(s)
2. Saves order as HL7 Message
3. Send order to the HL7 Server
4. DICOM Messages are created
5. The order is then stored in a database
6. DICOM Modalities will then query the database for its DICOM worklist

The order is stored in the Database for 7 days after its expiration date (after planned performance day). The HL7 server supports protocols 2.0 and up. Support of the 3.0 protocol is planned for the near future.

Medweb RIS and web scheduler has the following main windows (pages):

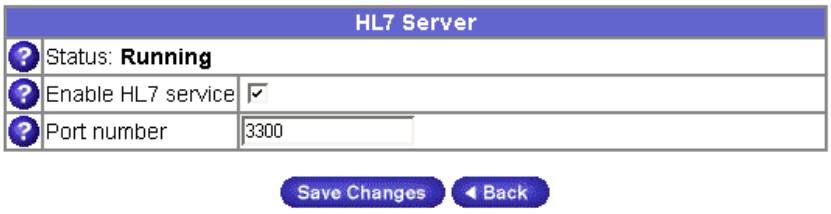
- **Order Scheduler page**
  All viewing, editing and management of orders is completed here.
- **Machine Scheduler page**
  This page is a timetable of machine working hours and periods assigned to different doctors.
- **Machine List** in the Administrator section

10.3 Configuring and Using the RIS

10.3.1 HL7 Server

To begin using the RIS, make sure the HL7 Engine is running before proceeding. Only the Administrator of the Medweb server has the authority to perform this function.

Administrator Site - Control Panel – HL7 ***Click Parameters***



1. Check the check box to Enable HL7 Service
2. Enter port number **3300**
3. Click **Save Changes**
4. The Status should change from **Not Running** to **Running**
5. Go back to the Public Site.

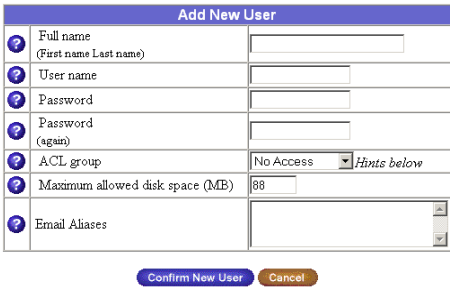
10.3.2 Adding a *Scheduler* User

The Server administrator must assign a Scheduler user to manage the RIS (The administrator of the Medweb server is responsible for Adding Machines, Setting HL7 settings etc).

1. Sign on to the Medweb Server and login as the Administrator. Click on Administrator Site on the Navigation Menu and then click the **User** Button.

2. Click the Add User button.

3. Fill in the user information and provide a password. The username used by the Server to identify the user. It also appears in the URL of the web site and the email address of the user. Only lowercase alphanumeric characters, periods (.), hyphens (-) and underscores (_) are allowed.



4. The Administrator must to assign a password for the user account being created. Enter a password containing 3 to 16 characters. A string password is one that is difficult to guess, not

found in any dictionary, and is 5 or more characters with at least one non-alphabetical character. Passwords are case sensitive.

5. Assign the user to the **Scheduler** ACL group. The Scheduler has the following permissions:

- Allowed to access the Medweb Server
- Sees only the RIS page (no access to View Patients)

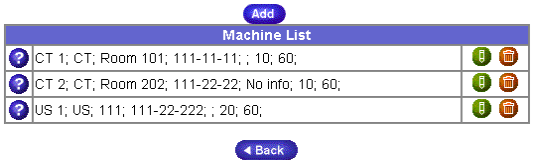
6. Click **Confirm New User.**

10.3.3 Adding Machines/Modalities

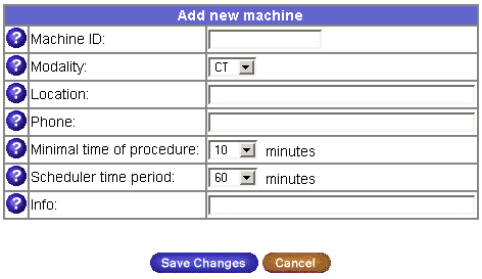
Machines/Modalities need to be added to the RIS in order to receive patient orders (appointments). Only the Administrator can perform this function.

Administrator Site – Control Panel – MiniRIS ***Click Parameters***

This table below will appear empty if no machines have yet been added.



1. Click **Add** to add a machine/modality.



2. Enter the Machine ID – any set of letters and numbers (no apostrophes, dashes etc) i.e. US1, CT2.

3. Select the modality type from the drop down list.

4. Enter Location information for the modality.

5. Enter a Phone Number.

6. Select a Minimal Time of Procedure from the drop down menu.

7. Select the Scheduler Time Period from the drop down menu. (This is the length of time per Appointment) i.e. 60 minutes = 1 Hour slots in the Patient Order Table.

8. Enter any pertinent or extra information in the Info field (not required).

9. Click **Save Changes** to add the modality.

10. Repeat this process for multiple modalities.

10.3.4 Adding/Editing/Deleting Modalities

The Server administrator must do all Modality/Machine Management.

1. To administer the machines, enter the Administrators Site and select **Control Panel**.

2. Navigate to MiniRIS and click **Parameters.** The current list of modalities will appear in a list.

3. To Edit: Click the Pencil icon next to the study you would like to change. Make the appropriate edits and click Save Changes.

4. To Delete: Click the Trashcan icon next to the modality to be deleted. This is a permanent delete.

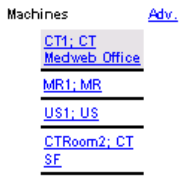
10.3.5 Scheduling Doctors/Operators on the Modalities

The machines now need to be scheduled. Doctors will "own" all or some time on the modalities for a specific period of time—whether it is hours within a day, days, weeks or months. This function allows the institution the option to "rent-out" the machine to external Rads to use for certain periods of time.

***NOTE**: You do not need a doctor to be scheduled on a machine in order to book a patient order but the program will warn you if the patient's appointment falls in an "unscheduled period". You may then proceed to the Schedule of Machines page and schedule a Doctor for that time period.*

1. Enter the URL of your Site into the Browser. From the Home Page (Public Site), Click the **Workflow** button on the left side.

The Machine Schedule will default to the first Machine in the list of modalities added.
A list of machines appears on the right hand side below the calendar.

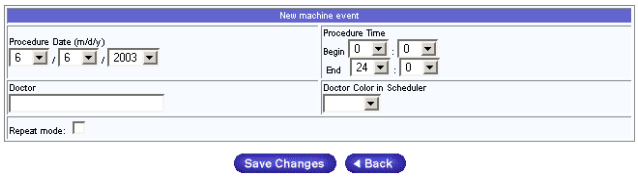


3. Select the Machine/Modality to schedule by clicking on the hyperlink for the desired machine.

4. If the Machine Schedule is completely empty, you will see a column with the time period (00:00-24:00) and another column with text that says "**NOT AVAILABLE PERIOD**".

5. The schedule will also default to Today's Date. Look at the calendar on the right hand side to verify the date. The current date will be highlighted with color. Any date can be chosen to schedule a doctor for a machine.

6. To begin scheduling the machine, Click the hyperlink on the 00:00-24:00 or click the **New Period** button on the right hand side.



7. **Procedure Date** – This will default to the current date.

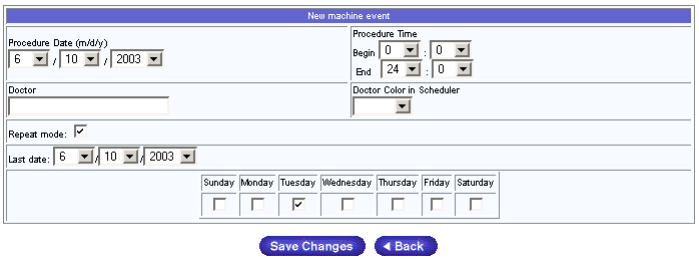
8. **Procedure Time** – Use this to schedule your desired period. If you want to schedule the whole day, select 00:00-24:00 as the Procedure Time.

9. **Doctor**- Enter the Doctor's name or Modality Operator for this period.

10. **Doctor Color** – Select a color to associate with this doctor.

11. **Repeat Mode** – Use this check box to schedule a doctor on this machine until a particular date. If you want the doctor to be scheduled only for the date indicated in the Procedure Date field, then do not click the Repeat Box.

Example: Dr. X wants to have the Ultrasound (for x number of hours that were chosen above) every Tuesday and Thursday until August 3, 2003.



A. **Last Date** - The end date for the schedule (in the above example – August 3 2003)
Use the drop down menu to choose the date.

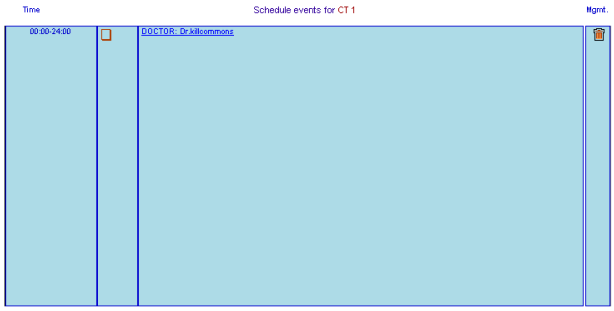
B. **Days of the week** – Select the check boxes to choose the days of the week to be scheduled (In the above example – Tuesday and Thursday).

NOTE: *If you want a machine to be available all day round, create one new event. Set the working hours from 00:00 to 24:00. If you do not want to assign the machine to any doctor, skip the field.*

For a 24/7 event, check all days in repeat mode.

12. Click **Save Changes**.

The Machine Schedule Table, for the selected date, will now indicate that a Doctor is scheduled for that machine for a particular period of time. This row in the table will be the color that was chosen to be specific to that Doctor. See below.



Column 1 displays the time period
Column 2 displays an icon that indicates whether this time period is a single or repeated event.
Column 3 displays information about the doctor scheduled for this time period.
Column 4 displays a trashcan icon so the schedule can be deleted if necessary.

Continue to schedule the machine as necessary. Use different colors to differentiate the doctors and their periods.

Any unused time periods (unscheduled) will not be seen in the Schedule Table.

10.3.6 Changing the Schedule Date

You may select different dates, with the calendar to schedule machines as far in advance as necessary. Use the << and >> to move the month ahead or back. Select the day of the month by clicking the desired number.

10.3.7 Managing Schedules

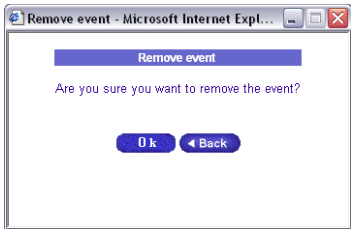
10.3.7.1 Editing Schedules

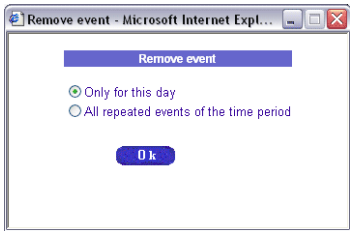
To edit a scheduled period, click the hyperlink on the Doctors name and make any changes necessary. Click Save Changes.

***NOTE**: If the scheduled period to be edited is a repeating event, you MUST click the Repeated Events check box to show the event period in the extended table. If the scheduled period has repeated events and edits are made and then saved without checking the Repeated Events check box, the event will then be saved as a single event. The edit will cancel the repeated event.*

10.3.7.2 Deleting Schedules

To delete, click the Trashcan icon next to the time period to be removed.
Deleting a single event is simple: just confirm deleting in the pop-up window:





If an event is repeating, you can delete either the selected (current) date event, or all events of the series. If you select the first option, only one event will be deleted from the schedule. The second option will allow the removal of all similar (same-time and doctor) events from all days in the event series.

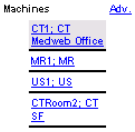
10.3.8 Creating Patient Orders

To begin creating patient orders, the *Scheduler* must go to the Order Schedule Page.

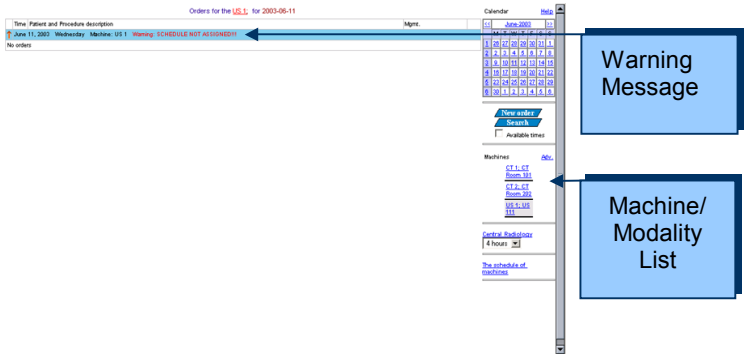
1. From the Machine Schedule page, click the Order Schedule link on the lower right side OR click the **Schedule** Button on the Menu on the left side.

OR Orders schedule

2. Select which modality/machine to schedule patients for using the machine links on the right side below the calendar.

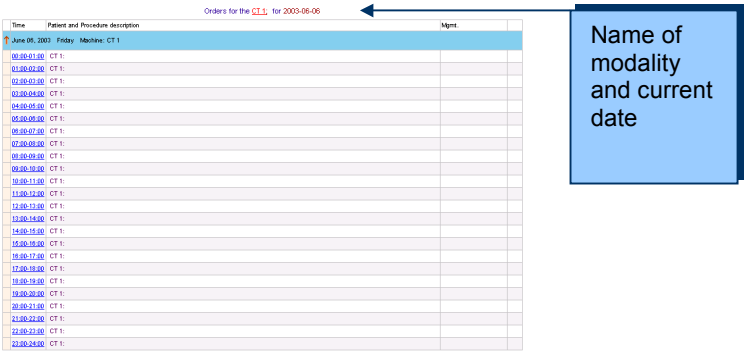


3. If the machine has no schedule assigned (which means no doctor has been assigned to this machine for ANY period of time for that day) the following message will appear in RED at the top of the Order Schedule Table: **Warning: SCHEDULE NOT ASSIGNED!**

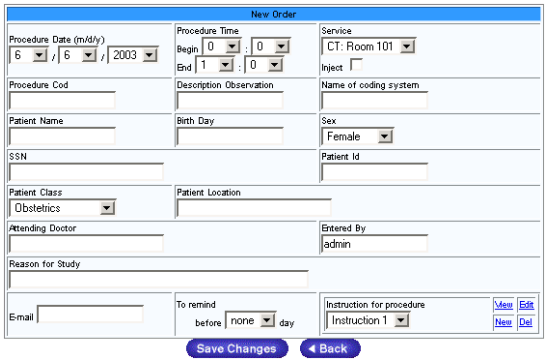


You may add patient orders while this message is present but no Doctor will be assigned for the time. To schedule a Doctor on the machine, go to Section 3.5 Scheduling Doctors/Operators to the Modalities.

4. Select the desired machine on which to schedule orders using the names on the right side of the screen. The name of the chosen modality will appear at the top of the table.



5. Click the time period (ex. 09:00-10:00) you wish to schedule or click the **New Order** button under the calendar on the right side.



To create the new order, fill in the following fields.

6**.** Procedure Date**: The date input format is: month/day/year. By default, the current date is shown.**

7**.** Procedure Time: Choose the start and finish time of the procedure.
The Procedure time options are limited to the working hours of the machines.

8. **Service**: Select the Machine/Room to be scheduled.

9. **Inject**: This check box indicates if the patient has to be injected before the procedure. Injection requires presents of a doctor besides the technician doing the procedure.

When the box is checked, the order information will be highlighted green in the Central Radiology monitor.

10. **Description Observation**: This field contains a short description of the procedure, using terms and standards of a preferred coding system. Included also can be the quantity of images taken and other image characteristics. The coding system is defined in the **name** of coding system filed, located next to Description observation.

11. **Patient Name, Birth Day, Sex and other personal information**
These fields contain important personal data of the patient.

Format:
Name: Last Name, First Name.
Date of birth: yyyy/mm/dd
Sex: Male/Female
SSN: Social Security number, if provided

12. **Patient ID:** You can enter the unique patient ID here, if it is used.
If you leave this field empty, the number will be given automatically be the system.

13. **Patient Class:** Choose the category from the list box.

14. **Patient Location:** Define the patient's location at the present time (hospital, room, home, etc.)

15. **Attending Doctor:** Enter name of the doctor who ordered the study.

16. **Entered by:** By default, the system puts inserts the login name of the user, who created the order.

17. **Reason for Study:** This field may contain more detailed information about the study and the diagnosis.

18. **E-mail:** Enter the patient's e-mail address. The e-mail will be used to send reminders to the patient.

19. **To remind:** To remind the patient about the procedure via email, select number of days in advance the email should be sent. If you select "None" the letter will not be sent.

The reminding e-mail will be sent to the patient the selected number of days before the procedure.

The reminder would contain general procedure information and instructions for preparing for the procedure.

- To send instructions with the reminder, select its name in the list box.

The list will show only instructions relevant to the modality of the procedure.

- To view the contents of pre-entered instruction, press **View**. The text of instruction will appear separate window.
- To edit a particular set of instructions, press **Edit.** You can change the header and the contents of the instruction in the window. When finished, press the Save button.
- To create a new instruction, press **New.** Give the instruction a distinct name, enter the description and press the Save button when finished. The name of the instruction will immediately appear in the instruction list.
- If you need to delete an instruction, press **Del**. A window with the instruction text will appear. Use the Delete button to delete the instruction completely.

20. Once finished creating or changing the order, press the **OK** button under the order.
If you do not want to save changes, press **Back** button to return to the scheduler main window.

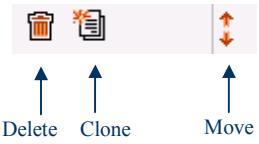
10.3.9 Managing Existing Orders

10.3.9.1 Editing Orders

To change one or more parameters of an exiting order, click on its description hyperlink in the order table. Change the needed parameters, and press "Save changes" button. Press "Back" to return without changes.

10.3.9.2 Deleting Orders

Use the trashcan icon next to the order to delete. This button allows you instantly delete the order from the system.



10.3.9.3 Cloning Orders

This button opens an independent order editor window with the information copied from the selected patient order. This feature allows the user to easily create a new order using the base of existing one.

10.3.9.4 Moving Orders

Use the Up and Down arrows in the last column on the Order Table to move that patient order to an earlier or later time slot that day. One click moves the order by one time period.

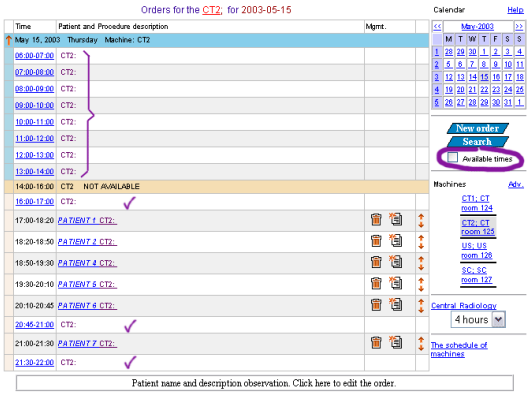
This function is available when viewing schedule only for one machine.

NOTE: *The Order Scheduler will allow you to move the order only within the working hours of the machine. If the order you are moving gets next to another order, then both (or more) adjacent orders will move at the same time one time period each. If you want to switch over the time of two orders, it is better to do it in editing mode.*

10.3.10 Available Time Mode

Available time mode is designed for easy viewing and finding time for new orders.

In this mode the list of orders will look shorter, because all spare hours between existing orders will be combined in one period. Check the box to enter the available time mode, uncheck to return to full time mode. Compare the standard view of the order table:



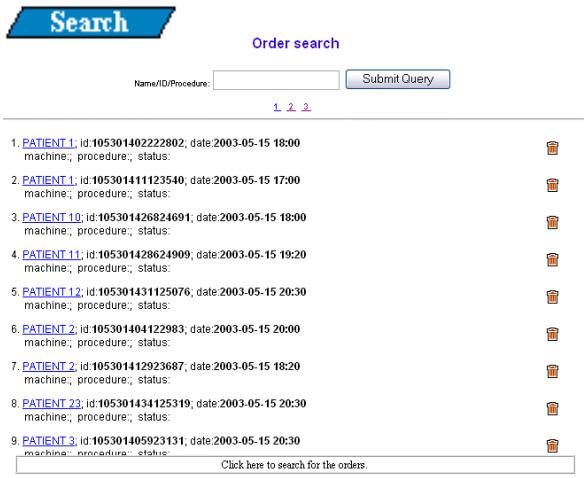
And the same schedule in Available Time mode:

The second table is much shorter, and provides a better view of the order appointments.

NOTE: *The Order Scheduler will show only those spare time periods, which are equal or longer than minimal procedure time, defined for this machine by admin.*

10.3.11 Patient Order Search

To search for an order, click to Search button at the right of the Order table.


Search
Order search
Name/ID/Procedure:
Submit Query
1 2 3
1. PATIENT 1; id:105301402222802; date:2003-05-15 18:00
machine:; procedure:; status:
2. PATIENT 1; id:105301411123540; date:2003-05-15 17:00
machine:; procedure:; status:
3. PATIENT 10; id:105301426824691; date:2003-05-15 18:00
machine:; procedure:; status:
4. PATIENT 11; id:105301428624909; date:2003-05-15 19:20
machine:; procedure:; status:
5. PATIENT 12; id:105301431125076; date:2003-05-15 20:30
machine:; procedure:; status:
6. PATIENT 2; id:105301404122983; date:2003-05-15 20:00
machine:; procedure:; status:
7. PATIENT 2; id:105301412923687; date:2003-05-15 18:20
machine:; procedure:; status:
8. PATIENT 23; id:105301434125319; date:2003-05-15 20:30
machine:; procedure:; status:
9. PATIENT 3; id:105301405923131; date:2003-05-15 20:30
Click here to search for the orders.

You can search orders using the patient's name, ID or procedure using the whole word, number or just part of it.

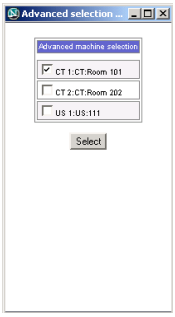
The search results are presented in a list of orders with short description for each.

When multiple matches are found, the list is separated in several pages (see the hyperlink numbers under the search form.)

By clicking on the order link, the order-editing window will open so that you may modify the order. You can delete the order from the Search Results using the trashcan icon. In this case the order will be deleted from the database.

10.3.12 Viewing All Orders for all Machines (Beside the list of machines on the right side)

Click the **Adv.** button to view all the machines and all the orders scheduled on the machines. A new window will open with all the machines that are available; each with a check box. Select all or some of machines you would like to view.



The list will only populate the times for the machines that have been assigned/scheduled to a doctor and therefore cuts out a lot of unused space.

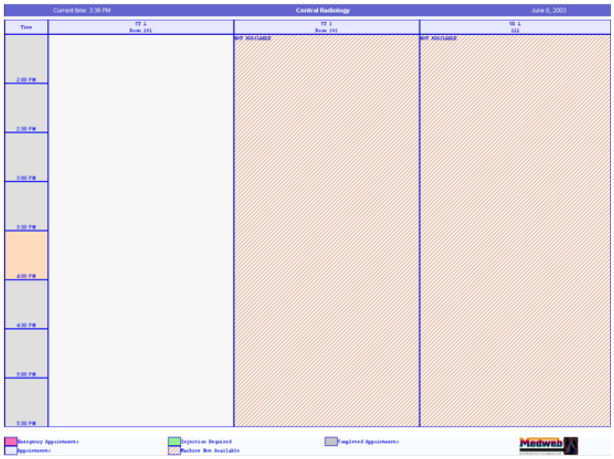
10.3.13 Central Radiology (Below the list of machines on the right side)

Central radiology monitor is a part of the system that graphically represents the schedule of current appointments based on RIS Order scheduler. The table data includes all machines available and appointments with patient names. The schedule includes 2 hours of past appointments and 2,

4, or 6 hours of future appointments. Use the drop down menu to select the number of hours of future appointments to view.

As time passes, old exams slide off the top of the schedule and new exams show at the bottom.

The size of block for certain appointment depends on the type/length of the procedure, and the number of hours displayed.



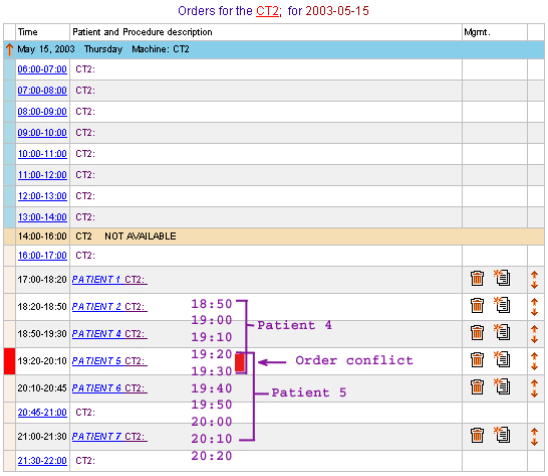
If there are few short exams at one period of time, the block will contain the number of orders. The color of block represents the type of the procedure:

- Grey - for completed exams
- Red - for emergency appointments
- Green - for appointments that require injection of the patient and presence of a doctor.
- Striped – the machine is not available.

10.4 Resolving Schedule Conflicts

10.4.1 Order Schedule Conflicts

If the period of a new order overlaps with the time of an existing order, the Order scheduler will display both orders. At the same time, a bright red color in the first ("doctor") column of the order table will indicate the presence of the error. If you mouse over the red square, a message will appear stating that: "The order is in an inaccessible time period or overlaps another…".



Correct the order time unless the overlapping was done intentionally.

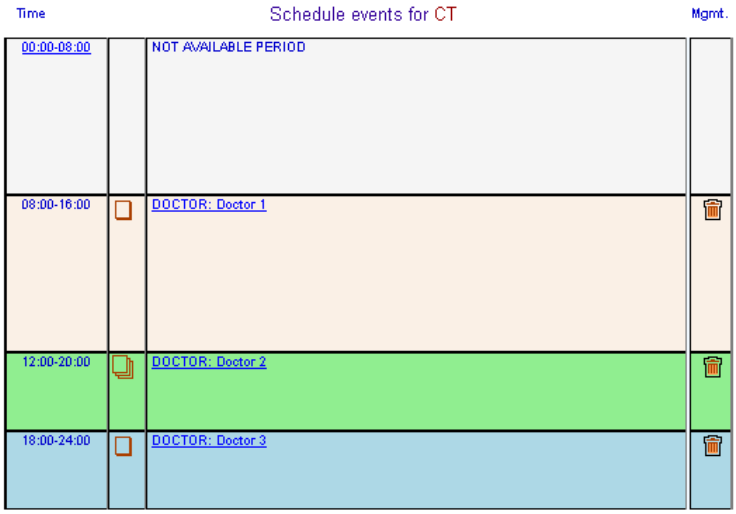
10.4.2 Machine Event Conflicts

Machine event conflicts occur in several cases:

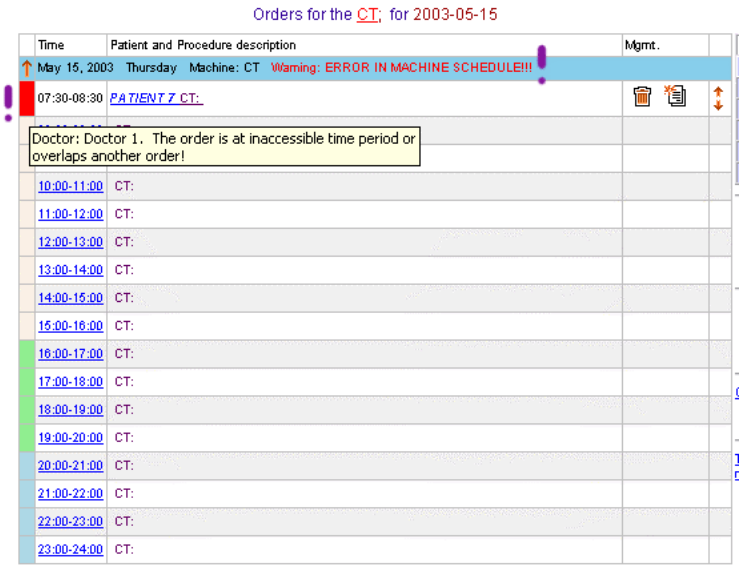
If you must set periods of time that overlap one another, the priority in the scheduler will be given to the earlier period. In this case the subheading of the list will contain a warning about the error.

Setting one period of time inside another will be displayed in the machine schedule page, but will not appear in the order scheduler page. An error message will be given instead.

This is an example of a conflict in the machine schedule.



And the results of the conflict in the Order schedule:



Here you can see a conflict in the machine schedule and order schedule. It is marked with red in the first column.

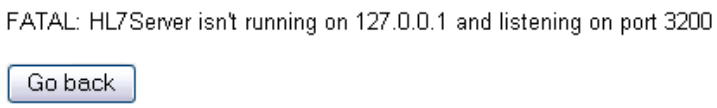
10.5 System Messages, Errors and Solutions

1. ***No machines defined in the system***

If you get the following message on the main page (Order schedule):

This means that no machines have been listed/added in Machine Management
in the administrator section.
You cannot set machine schedule or make any orders without adding any machines/modalities.
Contact administrator to add machines/modalities to the list or refer to Section 3.3 in this manual.

2. Server is not running



Contact the administrator to start the HL7 server or refer to Section 3.1 in this manual.

If you require further assistance, you may consult the **Help** link at the top right side of the Scheduler Windows or submit your question to Medweb at ts@medweb.com and a technical support representative will contact you.

Appendix A

DICOM SOP CLASSES

SCP = Service Class Provider
SCU = Service Class User

Generic Storage Service Class/SCP
Can receive and store DICOM images
Example: Medweb RaQ/Cube, other vendor's servers.

Generic Storage Service Class/SCU
Can send DICOM images to storage
Example: Medweb RaQ/Cube, DICOM Workstations like e-Film, etc.

Generic Gray-Scale Printer/SCP
Can receive and print DICOM images
Example: DICOM printers from Kodak, GE

Generic Gray-Scale Printer/SCP (Bare-support)
Can receive and print DICOM images (Bare-support)
Example: DICOM printers from Kodak, GE

Query/Retrieve - Patient Root/SCP
Query: Can receive and process search queries (patient fields)
Retrieve: Can receive and process "retrieve" requests and send DICOM images from storage to requester
Example: Medweb RaQ/Cube, other servers from Kodak, etc

Query/Retrieve - Study Root/SCP
Query: Can receive and process search queries (study fields)
Retrieve: Can receive and process "retrieve" requests and send DICOM images from storage to the requester
Example: Medweb RaQ/Cube, other servers from Kodak, etc

Query/Retrieve - Patient/Study Root/SCP
Query: Can receive and process search queries (both patient and study fields)
Retrieve: Can receive and process "retrieve" requests and send DICOM images from storage to requestor
Example: Medweb RaQ/Cube, other servers from Kodak, etc

Query/Retrieve - Patient Root/SCU
Query: Can send search queries (patient fields)
Retrieve: Can send DICOM "retrieve" requests
Example: Medweb RaQ/Cube, DICOM Workstations like e-Film, etc.

Mitra Report Query Class/SCP
Can send Mitra reports (special standard from www.mitra.com company) to requestor
Example: Medweb RaQ/Cube, other servers from Kodak, etc

Mitra Report Query Class/SCU
Can request Mitra reports from SCP
Example: Medweb RaQ/Cube, DICOM Workstations like e-Film, etc.